Innovative Pressure Mapping Solutions

FSA 4.0 User Manual
2nd Edition

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Welcome to FSA Version 4.0 - The Complete CLINICAL SUITE

Verg Inc.

FSA is short for Force Sensitive Applications, a clinical tool that allows users to evaluate interface pressures between a person and the support surface they are sitting, standing or lying on. The FSA pressure mapping system is a complete, versatile tool that provides accurate information in a usable, easy to read format. From helping assess a patient in their wheelchair, to helping design new automotive seats. From assessing a saddle's fit, to helping choose the best running shoe, the FSA system gives you the power to help.

FSA 4.0 User's Manual 2nd Edition

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1 Introduction

1.1 Welcome to FSA Version 4

Welcome to FSA Version 4.0 - The Complete CLINICAL SUITE

Components of an FSA

The FSA system consists of one or more pressure-sensing mats, an interface module, connecting cables (accessories), and computer software.

- The UltraThin FSA mat is comprised of thin, flexible fabric piezo resistive sensors and is covered with polyurethane coated rip stop Nylon.
- The interface module is the electronic communicator between the mat sensors and the computer. The interface module connects to the computer via the serial or USB cable supplied with the system.
- The computer software allows the clinician to view, annotate, file and share the information gathered by the sensors.

FSA 4.0 software is a 32-bit compilation optimized for Windows XP and up (see System Requirements for current minimum and recommended system requirements).

We advise all FSA users to read this entire instruction manual before trying to operate the FSA Pressure Mapping System.

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1.1.1 An Overview of FSA 4 for FSA 3.1 Users

FSA 4 is intended to be easier to install, configure and use while offering more features than FSA 3.1. The software has a modular design so that it can be quickly re-shaped into custom applications, but it is still in many ways the same as version 3.1; the user opens a file, scans and annotates new readings and then saves the readings to file. The following summarizes where the new software is different:

More sophisticated FSA files

The 3.1 FSA files contained client info and a series of recorded frames. An FSA 4 file contains the client info along with one or more recordings. Each recording can be a different type, so an FSA file could contain information about a client along with a left shoe recording, a right shoe recording, a pair of shoes recording, and an ortho test recording, all in one file. The client info and each recording appear as a tab allowing the user to quickly switch between them. Each recording contains all the information required to display the readings as they were originally recorded.

More sophisticated calibration files, the SensorArray file

The FSA 3.1 calibration files contained information such as the number of rows and columns of sensors, the range to which those sensors were calibrated, and some information gathered during the calibration process. Calibrating to different ranges required creating another cal file. In FSA 4 the "cal file" is replaced with a SensorArray file. For every mat there will be one (and only one) SensorArray file. The SensorArray file contains a detailed description of a SensorArray (aka mat) including the number of rows and columns, the recommended range, the size and shape of the mat right down to the shape and colour of its cover and cable. Along with the mat description, the SensorArray file contains a collection of calibrations, including a "factory" cal that the user cannot delete or overwrite. This one to one relationship between mat and mat information should simplify the user experience. Each SensorArray file can simply be named the same as the serial number of the mat, no need to encode the range in the filename. All SensorArray files are stored in the FSA SensorArray directory (aka folder).

The end of the INI file

Instead of configurations stored in an INI file the new software uses templates to create new documents. Templates are simply FSA documents that contain no readings, and are stored in a separate directory, the FSA Templates directory (aka folder). Adding a new "configuration" is as simple as copying a file to this directory.

Snazzy new look

The new software has a new XP style. The toolbar has been cleaned up and is moveable. The display shows a mat with its cover and cable. Readings are drawn on top of the mat making it easy for the user to relate what they see on the screen to the real world. The display is divided into panels with a different control in each panel. Right-click on a panel and select the control you want to see in that panel. Resize each panel by dragging the line that divides the panels. Right-click on a divider to swap panels to the opposite sides of the divider or change from a horizontal to a vertical line. Rotate the surface plot by clicking on a corner of the mat and dragging it about its center. Don't like the statistics you see? Click on any one of the stats and select a different one from the popup list. Use the arrows on the legend to adjust the colours. Click on the colour bar in the legend to toggle from colour steps to blended colours. Once your satisfied with the layout save it to the template directory so you can create new documents that have this same layout.

Intuitive hardware configuration

As much as possible the user has been shielded from the hardware details, however, in the event that they are required to change a setting they can do so in a much more intuitive manner using the **System Settings** dialog box found under the menu bar selection **Tools**. Instead of a series of tabbed windows within tabbed windows the user is presented with a tree representation of the hardware for one click access to the settings they need.

The Calibration Wizard

The **Calibration Wizard** is accessible directly from the **Tools** menu. The **Calibration Wizard** has had a face lift and has reverted back to the easy one-large-bladder calibration process. When the FSA 3.1 cal wizard finishes it creates a new cal file and verification file. The new wizard doesn't, instead it adds a new calibration to the current

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SensorArray file and, if it performed a verification, it attaches the recording to the current document. If the current document contains a single empty recording then that recording is deleted. No need to seek out the verification file and open it, its already open in the current document. The verification can be reviewed and then saved or discarded.

Video without VideoPort

To record frames with video simply open **System Settings** from the **Tools** menu and check the "**Use camera**" check box. The 3.1 software required that the user select a special video configuration and all frames in the recording have to contain video. With FSA4 the video feature can be turned on and off at will. There's no need to commit to using video for an entire recording. Record some frames with video and others without. All recordings have the ability to include video. Captured images appear in the bottom right corner of the display. To enlarge the picture click and drag the divider that separates the note and picture from the rest of the display. The note and picture always have the same height while the picture automatically adjusts its width to be four-thirds its height. FSA 3.1 is limited to recording little more than 60 frames with video (no matter how much memory you had) but the new FSA 4 software is limited only by the amount of memory on the computer.

FSA logo

The FSA logo is displayed in the software at all times.

Selectable regions

The user is now able to select regions of a mat and generate statistics for each region.

Time plot

Timeplot contains a plot of a selectable statistic over a period of time.

Do-it-yourself tools

The software's functionality will be extendable by adding tools. Tools would consist of scripts (Java, Visual Basic etc) or special DLLs that would have access to the current document. These tools could be used to extract information from the document into a user specific format, modify the recordings or record a set of readings in a user defined way. The possibilities are endless. All tools are stored in the Tools directory (aka folder). Adding tools will be as simple as copying a tool file into the Tools directory.

1.1.2 System Requirements

FSA 4.0 requires the following to operate:

Minimum:

A PC running the Windows 98SE, Windows 2000 or Windows XP (Home or Professional) operating systems.
3.2 MB of free hard drive space.
If the computer has enough RAM to run Windows 98SE it will run FSA 4.
Display capable of High Color (16 bit), 800x600 resolution.
CD-ROM drive.
Either a serial or USB port.

Recommended:

A PC running the Windows XP operating system.
If the computer has enough RAM to run Windows XP it will run FSA 4, we strongly suggest you go with at least 256 MB.
Display set to 24 or 32 bit, with a 1024x768 resolution.

For video:

Camera must have VFW (Video For Windows) compatibility. Please check the driver and operating system compatibility specifications for cameras you are considering purchasing for use with FSA4, or contact FSA technical support at techsupport@verg.com for suggestions.
If you plan on using video, pay attention to the minimum system requirements for your camera.
We strongly recommend running Windows XP if you are going to be using the video feature of FSA4.

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1.2 IMPORTANT - READ CAREFULLY

1.2.1 Verg Inc. Software License Agreement

By opening the packages containing the software and hardware, you indicate your acceptance of the following Software/Hardware License Agreement.

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5/8/96

1.2.2 Limited Warranty

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1.2.3 User Assistance Information

If you have any questions about the FSA System, or if you are experiencing technical difficulties, please contact Verg Inc. at the following address:

Verg Inc.
Unit 3-55 Henlow Bay
Winnipeg, Manitoba, Canada
R3Y 1G4
North America Toll Free Technical Support 800-847-3157
Local 204-949-7660
Monday to Friday 8 A.M. to 4:30 P.M Central Standard Time
e-mail: techsupport@verg.com

Visit our **Website** at:
www.pressuremapping.com
For non-technical issues, please contact your distributor, a listing of our worldwide distributors can be found online at
http://www.pressuremapping.com/contact/contact.html

Europe:
Jan Hermkens
Vista Medical Europe B.V.
Industrieterrein 40
5981 NK Panningen
The Netherlands 5981NK
Phone: 31-77-465-2676
Fax: 31-77-465-1599
e-mail: info@vistamedical.nl

Before Calling Technical Support Try the Following:

- Disconnect all cables from the computer and interface module and then reconnect cables.
- Close down all programs running except FSA.
- Re-start computer.

When Contacting Technical Support Have the Following Information Ready:

- Version of FSA you are currently running. Click **Help-About FSA.**
- Name of your facility/company, current location and user.
- Type of computer equipment, interface module and mat(s). Serial #'s are useful.
- Note down the error messages, if any
- Note down any attempted solutions.

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1.2.4 Proper Care of the FSA Mat

- Do not fold the mat.
- Keep the mat dry. Protect the mat from incontinence, torque and shear forces by using the isolation bags provided.
- Place the mat gently on surfaces by using the corners.
- Do not pull on or carry the mat by the ribbon cable.
- Do not pivot on the mat.
- Do not pull on the edges of the mat while it is under a client.
- Do not pinch the mat between moving components of a support surface.
- Store the mat flat or in the original packaging (roll the mat around the foam core and store in the blue tube).

The Nylon covering should not be put in direct contact with broken skin. Improper care of and /or use of FSA mat(s) could possibly lead to malfunction, failure or damage to the FSA pressure-sensing mat.

1.2.5 Cleaning the FSA Mat

We recommend you use the isolation bags provided with your system at all times to protect against incontinence as well as torque and shear forces. If a small stain does occur, we suggest cleaning with a gentle shampoo in the following manner:

- Dip a DAMP, not WET sponge or cloth into a small (quarter sized or smaller depending on size of stain) amount of the shampoo.
- Gently apply to the Nylon covering using a light swirling and patting motion. Apply only the pressure of the sponge or cloth, do not rub the mat. This should remove most stains.

Blot to dry. Allow FSA mat to dry thoroughly before use.

1.2.6 Proper care of the FSA Interface Module

- Do not drop the interface module.
- Protect the interface module from exposure to moisture.
- Store the interface module in a location where it is protected from falling or in the original packaging (inside of the foam core and store in the blue tube).
- The Interface Module operates on 9V AC or battery power. To protect against possible damage to the interface module, only use the power supply provided with the system.
- We recommend the use of a suitable surge protector with the FSA interface module, as would be appropriate with any computer and/or computer peripheral.
- Plug the mat's ribbon cable securely into the interface module, be sure to keep the connector straight when inserting and removing so as not to bend the pins.

Improper care and /or use of the FSA Interface Module could possibly lead to malfunction, failure or damage to the FSA Interface Module.

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1.2.7 Cautions - Europe

Use only the power supply provided with the system. This power supply is certified to EN60601-1.Use of a power supply other than that specified could compromise patient safety.

External equipment, i.e. personal computer, intended for connection to signal input, signal output or other connectors, shall comply with relevant EN standard (e.g. EN 60950 for IT equipment and the EN 60601 series for Medical electrical equipment). In addition, all such combinations, medical equipment intended to be connected to the other equipment – systems - shall comply with the standard EN 60601-1-1, Safety requirements for medical electrical systems.
Equipment not complying with EN 60601 shall be kept outside the patient environment, as defined in the standard. [1]

Any person who connects external equipment to signal input, signal output or other connectors has formed a system and is therefore responsible for the system to comply with the requirements of EN 60601-1-1. If in doubt, contact qualified technician or your local representative.

[1] The normal distance of at least 1.5 m from the patient or the patient support shall be provided.

The FSA product has been certified to comply with 93/42/EEC for the purposes of CE Marking as a Medical Device.

CE
0413

1.2.8 Typographical Conventions

Special Bold indicates an item that must be selected such as a menu option, command button or list item, or a minor topic heading.
Italics are used to emphasize an important point.
Bold Italics indicate a warning.
CAPITALS indicate the names of keys on the keyboard such as INSERT, CTRL.
KEY+KEY indicate a key combination. Hold down the first key, continue holding it down, then select the second key.

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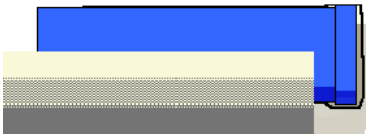
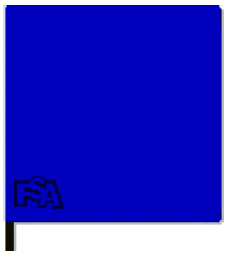
2 Component Description

2.1 Contents of the Blue Shipping Tube

	**Blue Shipping Tube with White Shipping Foam** your typical core FSA system will arrive with the sensing mat wrapped around the foam core, and the interface module and other accessories inside the foam. Save the tube and foam for storage or transportation of your FSA system.
	Typical **FSA Mats** are covered in a polyurethane coated ripstop nylon fabric. The mats have an attached ribbon cable covered with a black nylon braided cable sleeve and a 34-pin plug; the cable also gives the serial number and orientation (top/bottom) of the mat. The Nylon covering the FSA mat is blue on one side and black on the other. For easy orientation, blue is on top. *For purposes of good hygiene, to protect against tension and incontinence, and to increase durability of the mat ALWAYS use the UltraThin FSA mat with an isolation bag.*
	The Interface Module face has two 34-pin receptacles (A and B) for the ribbon cable from the FSA mat(s), and three LED lights. The rear of the interface module contains a single-pin receptacle for the battery pack or the Interface Power Supply, an 8-wire receptacle (similar to the common telephone jack in North America) and a USB B port. *Only use the Interface Power Supply or battery pack supplied with your FSA system with your interface module.*
Accessories:	
FSA Cables 1 serial cable and one USB A/B cable; both 6 feet in length, which connect the interface module to the computer via serial or USB port. **FSA Serial Port Extension** – 6 foot cable to extend the length of your FSA serial cable. Connects from the serial port on the computer to the FSA cable. Use also in cases when the FSA cable is unable to plug securely into the computer serial port due to the AC port on the cable's hood. **The Interface Power Supply** North American or Universal. **FSA Software CD** plus a **FSA SensorArray file CD** (if two or more mats purchased) **User Manual**, a paper version of the Help File. **Isolation Bags,** 10 clear polyethylene (plastic) bags (typical), 3 (UT3010 'Bed').	
Remote Sensing Apparatus consisting of:	
Manual Trigger Cable **Battery Pack with a 9 volt battery** **Web Belt** to hold the Interface Module during remote use	

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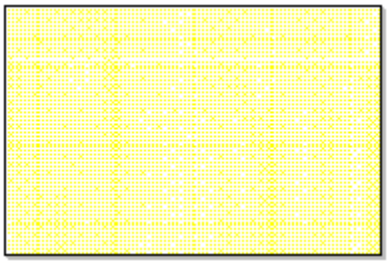
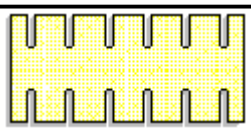
2.2 Contents of the Calibration Jig Box

<table>
<tr><td colspan="2">The calibration apparatus comes in a separate box and includes the following:</td></tr>
<tr><td>  </td><td>Platens, 2 are included, size is dependent on the FSA mat dimensions</td></tr>
<tr><td>  </td><td>Fingers, typical. The number and design varies with the FSA mat dimensions</td></tr>
<tr><td> </td><td>Slots, typical. The number and design varies with the FSA mat dimensions.</td></tr>
<tr><td colspan="2">Inflator Bags, 1
Aneroid (for up to 300 mmHg) or Digital (for high pressure applications up to 30 PSI)
Sphygmomanometer, 1 each
Air Pump and Chrome Valve, 1 each
Inflator Bag, 1
Latex or Neoprene Tubing, 2 lengths</td></tr>
<tr><td colspan="2">WARNING: The calibration apparatus has been designed to calibrate your FSA system to the pressure indicated on the label on your calibration jig platen.. For safety reasons do not exceed this value.</td></tr>
</table>

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3 Getting Started

3.1 Overview

The following section will show you how to install your software, set-up your hardware and walk you through a basic sample FSA session.

3.2 Software Installation

3.2.1 Installing FSA 4.0

From CD:

1. Insert the FSA CD into the CD-ROM drive (typically D :\) on your computer.
   If the setup does not start automatically:
   *Click the **Start** button and choose **Run** from the drop down menu that appears.*
   *Type **D:\setup** in the dialog box that appears. Left mouse click on **OK**.*
2. Follow the instructions in the installation wizard.

From Internet Download:

A password is required to download the FSA software from www.pressuremapping.com. Please contact Technical Support at techsupport@verg.com or 1-800-847-3157 if required.

1. Download the file 'FSAsetup v4_0_###.exe' to your desktop (suggested).
2. When the download is complete, double click the file "FSAsetup v4_0_###.exe' and following the on screen instructions.

indicates the release version.

FSA 4.0 can be run by restricted users, but may have to be installed by someone with administrative rights, depending on how your users rights are set up by your IT department. Please read footnote1 for important information regarding where FSA files are stored.
SensorArray files (*.cal) files will be copied in to your default SensorArray directory when you double click on the file. If the file is not copied in to your default SensorArray directory, you may have not been granted the required rights by your network adminstrator/IT department. Please contact them to perform that task for you or have them

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adjust your security settings.

Footnote1 If installing onto a computer that has never had FSA 4.0.XX installed before the FSA4 installation will create C:\Program Files\FSA4 as the root directory by default, and will create the following directories; they are what is being referred to throughout this users manual as the default directories (Windows XP or Windows 2000*):

C:\Documents and Settings\YOUR USER NAME\My Documents\FSA - which store your FSA files.
C:\Documents and Settings\All Users\Application Data\VERG\FSA\4.0\Reports - your printed report templates.
C:\Documents and Settings\All Users\Application Data\VERG\FSA\4.0\SensorArrays - your SensorArray (may be referred to as calibration) files.
C:\Documents and Settings\All Users\Application Data\VERG\FSA\4.0\Templates - your document templates (similar to configurations in earlier FSA versions).
C:\Documents and Settings\All Users\Application Data\VERG\FSA\4.0\Tools - your default FSA tool directory.

If the install is unable to create the directories where Verg intended, you will be prompted during the install to make that choice yourself.

If upgrading FSA 4.0.XX to FSA 4.0.196 or above:
The install will not create new directories, it will leave your existing FSA4.o directories as is.

*If running on Windows 98, your default directories will be:
C:\My Documents\FSA\Documents
C:\Windows\Application Data\VERG\FSA\4.0\Reports
C:\Windows\Application Data\VERG\FSA\4.0\SensorArrays
C:\Windows\Application Data\VERG\FSA\4.0\Templates
C:\Windows\Application Data\VERG\FSA\4.0\Tools

3.2.1.1 Version Compatibility Notes

- FSA 3.1 and FSA 4 can be installed to your computer simultaneously. They operate independently of each other.
- FSA files (*.fsa) created in FSA 3.1 can be opened in FSA 4. FSA files (*.fsa) created in FSA 4 can NOT be opened in FSA 3.1 or earlier.
- ***Once an FSA 3.1 file has been opened , altered and saved in FSA4, it cannot be opened in FSA 3.1.***
- Calibration files created in FSA 3.1 can be used in FSA 4. Copy the files into your default FSA4 SensorArray folder by double clicking on the SensorArray (*.cal) file. The old calibration files will be available under **Tools-System Settings** when the matching 'recording' template is selected.
- To view non-square FSA 3.1 files in their intended rectangular display, using a UT3010 'Bed' for example:
  - In FSA4, open the bed file you want to view. A 'Recording' tab will appear 32 x 32 in a square.
  - Go to **Edit-Select All**, then, **Edit-Copy**.
  - Go to **File-Add Recording**, select '**Bed**' , click **OK.**
  - Click on the '**Bed**' tab that appears .
  - Select **Edit-Paste**. Your data will paste in to that rectangular display.

3.2.2 Upgrading to or Re-installing FSA 4.0

If you need to reinstall or upgrade your FSA software:
Uninstall existing:

1. Go to **Start-Settings-Control Panel**, double click **Add/Remove Programs**.
2. Select 'FSA 4.0' from the menu presented, click the **Add/Remove** button. Follow the instructions

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presented.

3. Restart your computer.
4. Reinstall as per Installing FSA 4.0

You shouldn't need to uninstall and re-install when upgrading FSA 4.0.XXX to FSA 4.0.XXX. You may simply install over your existing FSA software.

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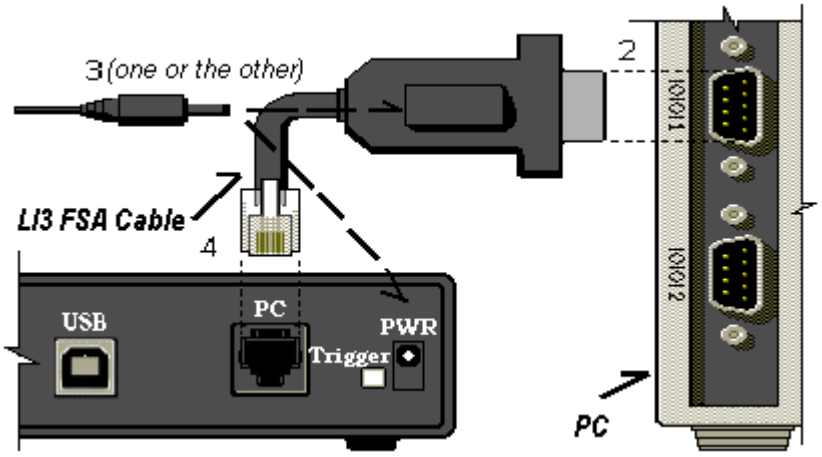
3.3 Hardware Setup

3.3.1 Hardware Setup - Serial

Connecting the Computer, Interface Module, and Mat:
Via Serial Port

Rear view of FSA Interface Module



1. Locate the FSA Cable LI3, interface module LI2, and Interface Power Supply ACC1010 (North America) or ACC2020 (Universal).
2. Plug the LI3 FSA Cable's 9-hole plug (9-pin serial port adapter) securely into a 9-pin receptacle (serial also known as COM port) on the back of the computer. (If the AC port on the hood makes this awkward, plug the FSA serial port extension into the COM port, and the FSA cable into its other end).
3. Plug the Interface Power Supply ACC1010 or ACC2020 into the receptacle attached on the top of the FSA cable's 9-hole plug or into the back of the interface module.
4. Plug the FSA cable's 8-wire plug into the back of the interface module.
5. Plug the Interface Power Supply into a power source. If connected properly, the green (power), amber (diagnostic) and red (read) lights on the interface module illuminate, indicating the interface module is receiving power. The amber light will go off in one second.
6. Find the FSA mat. Plug the mat's ribbon cable securely into receptacle A of the interface module. Use receptacle B for a second FSA mat's ribbon cable. Be sure to keep the connector straight when inserting and removing so as not to bend the pins.
   If the green light is not illuminated:
   Does the power source work? Is the Interface Power Supply secure?
   If the red light is not illuminated:
   Is the remote function engaged? Refer to section on Remote.
   If the red light is flashing (rapid fluttering is normal)
   Unplug the FSA cable from the interface module, wait 10 seconds, and then re-connect it.
   If the green and red lights are not illuminated:
   On some computers primarily laptops, the lights will not illuminate until a scan or record is initiated. If initiating a scan does not illuminate the lights please refer to the section Frequently Asked Questions..

If you do not have a USB capable FSA interface module and do not have a DB9/serial port on your computer:
You will need to obtain a high speed (115.2 kbps and up) USB to DB9 serial port adaptor, and install the adaptor to your computer. Your FSA cable (or serial port extension cable) would connect to the adaptor, which will connect to a USB port on your computer. Most adaptors come with software that will tell you what COM port your adaptor is - be sure to select that COM port from **System Settings - Interface Module**.
Note that you use EITHER Serial OR USB, not both.

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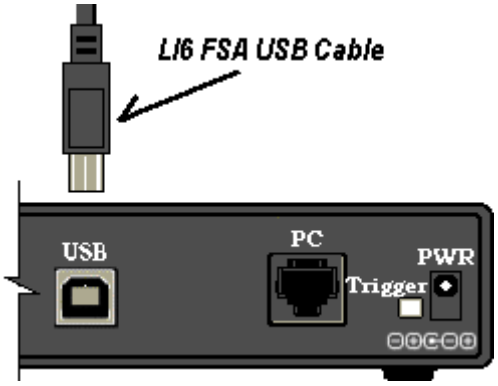
3.3.2 Hardware Setup - USB

Connecting the Computer, Interface Module, and Mat:
Via USB

Connecting the FSA hardware directly using the DB9 Serial port (if available on your computer) and associated cabling is the fastest set up initially as no drivers are required.
The FSA software installation off the CD should install the USB drivers for you. Please keep the CD handy just in case you de see a Windows Found New Hardware bubble pop up when you connect the module to the computer for the first time.

Rear view of FSA Interface Module



1. Locate the FSA USB Cable LI6, the FSA software CD, interface module LI2 and Interface Power Supply ACC1010 (North America) or ACC2020 (Universal).
2. Plug the LI6 FSA cable's USB A (the rectangular end) securely into an available USB port on your computer.
3. Plug the Interface Power Supply ACC1010 or ACC2020 into the back of the interface module.
4. Plug the LI6 FSA cable's USB B (the squared end) into the back of the interface module.
5. Plug the Interface Power Supply into a power source. If connected properly, the green (power), amber (diagnostic) and red (read) lights on the interface module illuminate, indicating the interface module is receiving power. The amber light will go off in one second. You should hear a Windows 'Device Connect' beep.
6. Find the FSA mat. Plug the mat's ribbon cable securely into receptacle A of the interface module. Use receptacle B for a second FSA mat's ribbon cable. Be sure to keep the connector straight when inserting and removing so as not to bend the pins.

If the green light is not illuminated:

Does the power source work? Is the Interface Power Supply secure?

If the red light is not illuminated:

Is the remote function engaged? Refer to section on Remote.

If the red light is flashing (rapid fluttering is normal):

Unplug the FSA cable from the interface module, wait 10 seconds, and then re-connect it.

On some computers primarily laptops, the lights will not illuminate until a scan or record is initiated. If initiating a scan does not illuminate the lights please refer to the section Frequently Asked Questions.
When you connect and disconnect a USB device, you should hear a tone from your computer. Wait to hear that tone before scanning.
To avoid communication errors try to connect your FSA to the same USB port on your computer every time you run the FSA system.

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3.3.3 Installing the FSA USB Drivers

Hardware/software requirements: *Minimum operating system requirements to use USB are Windows 98 with all updates and patches from the Windows Update site, Windows ME, Windows 2000, Windows XP. Windows 95 and Windows NT are not USB capable.*
Text in brackets applies to the FSA USB Autocalibrator only.
FSA 4.0 starting at version 196 should automatically install the USB drivers for you along with the software installation, if you are installing off of the CD. *If there is some sort of security setting or unknown Windows glitch that does not allow this to occur, you will need to follow the instructions on this page. If you get to step 4 below and no Windows Found New hardware bubble pops up, your drivers are likely already installed.*

Windows XP

1. Connect your 'LI6' FSA USB A/B cable to an available USB port on your computer.
2. Connect your 'LI6' FSA USB A/B cable to your FSA Interface Module (or FSA USB Autocalibrator).
3. Connect your 'ACC1010' or' ACC2020' FSA Interface Power Supply(or 'ACC7020'/'ACC7021 power supply if installing an FSA USBAutocalibrator) to your interface module (or Autocalibrator) and to a power source.
4. A 'Found New Hardware' bubble will appear in the lower right corner of your screen with the message 'Found New Hardware **USB <-> Serial'.** The bubble will disappear and the 'Windows Found New Hardware Wizard' will appear. Follow the on-screen instructions as follows.
5. Insert your FSA software CD into your CD Drive (typically D:). Click 'Next'.
6. The Wizard will search your drives and the internet (if you are connected) for the required drivers, and should find the required files on your FSA software CD. *Do not install the drivers from the manufacturers' (FTDI) website - you want the version 1.0.2154.0 drivers..* Click 'Next'.
7. Wait while the Wizard installs the drivers, then click 'Finish'.
8. The 'Found New Hardware' bubble then the 'Found New HardwareWizard' will appear again to install the **'USB Serial Port'** driver. Repeat step 6 and 7 above for the **USB Serial Port** driver.

You will see another 'Found New Hardware' bubble indicating that your device is ready to use.
You can now run your FSA device system through the USB port you installed to.

Windows 98 (Windows 2000 similar)

1. Connect the 'LI6' USB cable to your FSA module then to the USB port on your computer.
2. Connect your 'LI6' FSA USB A/B cable to your FSA Interface Module (or FSA Autocalibrator).
3. A 'New Hardware Found, USB<->Serial' window will appear, and another window with a progress bar (Windows 98) telling you windows is building a driver information base. The Windows 'Add New Hardware Wizard' will appear next.
4. Insert the FSA software CD into your CD Drive (typically D:). Click 'Next'.
5. The 'What do you want Windows to do?' window appears'. Leave the default 'Search for the best drivers for your device (Recommended)' selected and click 'Next'.
6. De-select 'Floppy Drives', 'Windows Update' and 'Specify a location', leaving just the 'CD Rom' option selected. 'Next'.
7. Windows will search the FSA software CD for the drivers. The next windows should indicate that Windows has found the best driver. Click 'Next'.
8. Please wait while Windows copies the file to your hard drive.
9. Click 'Finish' in the window that follows.
10. The 'New Hardware Found USB Serial Port' message will appear. Repeat above steps 5 through 9 for this device.

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3.4 Sample Session

For this example we are using a 'Seat' and will leave the display options at their default settings.
If the option is selected under **Tools-Options**, the COM port your interface module is connected to will be automatically detected when the FSA software is started up.

1. Open FSA by double clicking on your desktop icon.
2. Click the drop down arrow to the right of the **New** button in your FSA toolbar and select **Seat** from the drop down list that appears. You will see a tab labelled Seat with a Client Information tab behind it (this is actually the default that appears when you initially install and open the FSA software).
3. Click the Client Information Tab to add client specific notes such as name, date of birth, relevant medical history, etc.
4. Click the Seat tab to return to your main display.
5. Click the **Scan** button in the FSA toolbar (or hit F2 on your keyboard) to start collecting data.
6. Click the **Scan** button again to stop collecting data. You have created a single frame.
7. Click in the Note Area to add frame specific notes.
8. Repeat steps 5 through 7 one more time, then go to step 9.
9. Click the Save button or go to **File-Save** to save your file.

We have created an FSA file with two frames of data with associated client information and frame specific notes.

The serial number of the last sensor array file used with this template or existing file will appear in the status bar. If this is not the mat you are using, select the correct one by clicking on the message in the status bar to bring up the System Settings window. Click on the mat icon and select the correct serial number from the Sensor Array drop down that appears.

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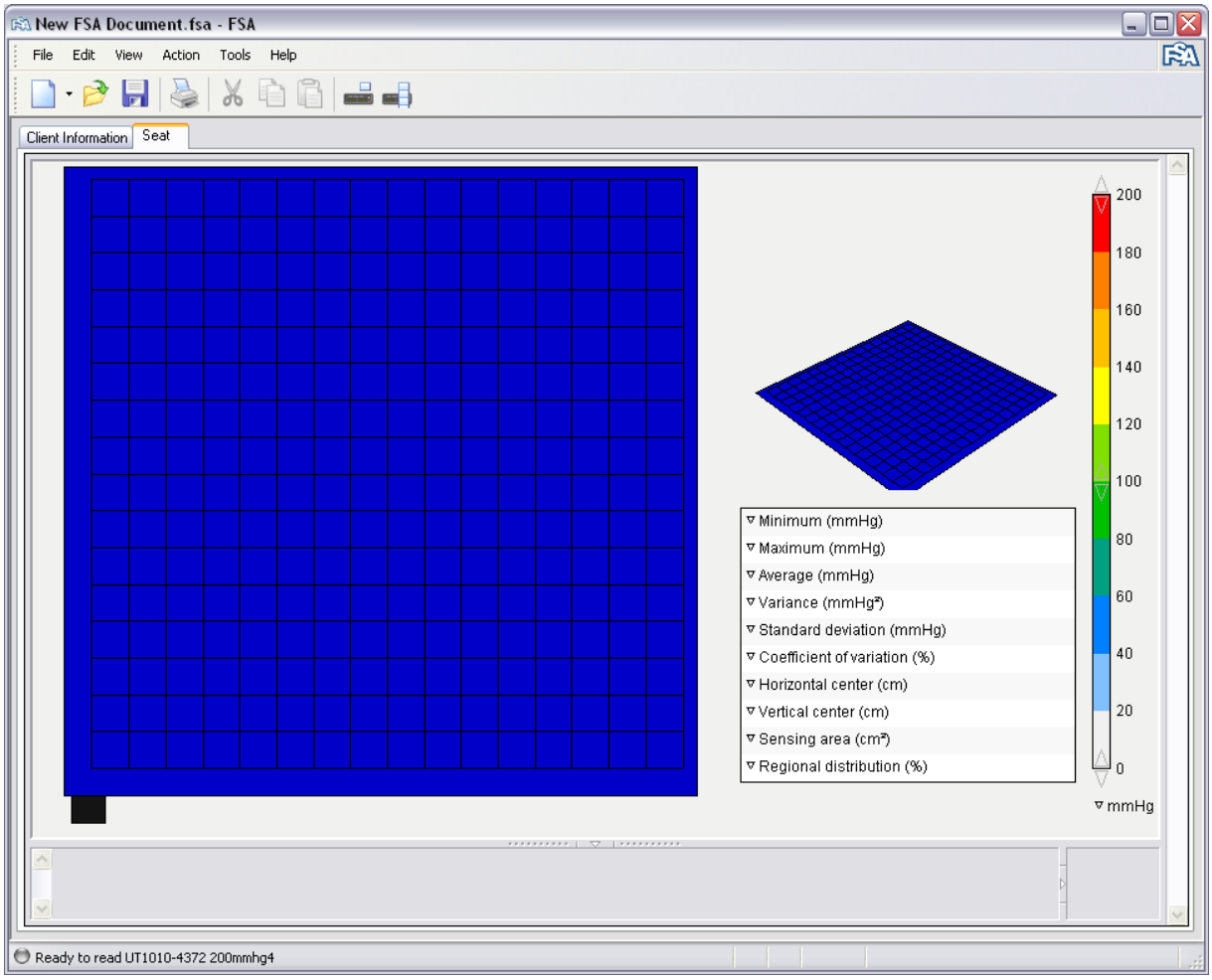
4 Operating Instructions

4.1 The FSA 4 Main Window

The default FSA 4.0 window. A 'Seat' template is open - the 'Status Bar' indicates that sensor array serial number UT1010-4372 is selected.



4.1.1 The FSA Title Bar

The title bar, located at the top of your FSA window, indicates the name of the FSA file that is open. When opening the FSA program, the program opens to a new file by default. It will remain Untitled - FSA until it is saved and given a file name of your choosing. The three icons on the far right of the title bar are Windows commands, which allow you to minimize, maximize and close (from left to right) the FSA file you are working with.

Title Bar Left Side

Title Bar Right Side

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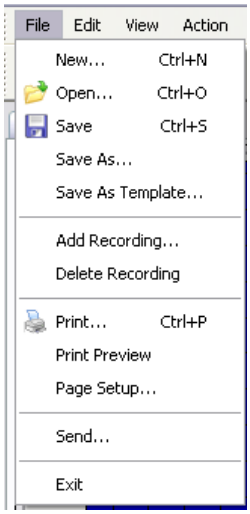
4.1.2 The FSA Menu Bar

Left mouse click on a heading then scroll down the menu that appears. Left click to select your task.

4.1.2.1 Menu Bar File

*Tasks available under **FILE:***



File-New: Starts a new FSA file. The Templates tab will open. Select the kind of recording you will be making (document type), and click **OK** (or use keyboard shortcut CTRL+N also see Toolbar New)
*TIP: You can also create a new FSA document from the Windows Explorer context menu. Right click over your desktop or inside a folder, and select **New-FSA Document.** Double click on the file to open FSA.*
File-Open: Opens an existing FSA file. The default Documents directory will open. Select (left mouse click) the file you wish to open, then click **OK** (or use keyboard shortcut CTRL+O also see Toolbar Open).
File-Save: Saves any changes made to your file since the last save. If saving for the first time, the Save As window will open into the default Documents directory, prompting you to name the file. Type a name in the 'File name:' window then click **Save** (or use keyboard shortcut CTRL+S also see Toolbar Save).
File-Save As: Saves an existing FSA file under a new name (also see File Save).
File-Save AsTemplate: Saves the current document as a Template, into the Templates folder.
File-Add Recording: Add a new recording (document type) to your currently opened FSA file. The Templates tab will open. Select the kind of recording you will be adding to your file (mat type you are using), and click **OK**.
File-Delete Recording: Deletes the currently selected recording (document type) from your currently opened FSA file.
File-Print: Opens the print dialog window specific to your printer (or use keyboard shortcut **Ctrl+P** also see Toolbar Print). Selecting **OK** from this window will print a report in the format currently set up under **File-Page Setup**.
File-Print Preview: Previews a report in the format currently set up under **File-Page Setup.** Printing from this window will create a report in the current settings found under **File-Page Setup**.
File-Page Setup: Opens the 'Page Setup' dialog window. For more detail on these settings refer to the chapter Printing Reports.
File-Send: Send the FSA file currently open to an e-mail recipient. To use, the computer you are using must have an e-mail account configured (please refer to your Internet Service Provider or I.T. support for assistance with this).
File-Exit: Closes FSA.

The FSA software will open in the folders/directories indicated as being the default unless the operator has changed that option under '**Tools-Options, Folders'**, or another folder was selected the last time a file was opened. For sake of clarity, this users manual will assume the defaults.

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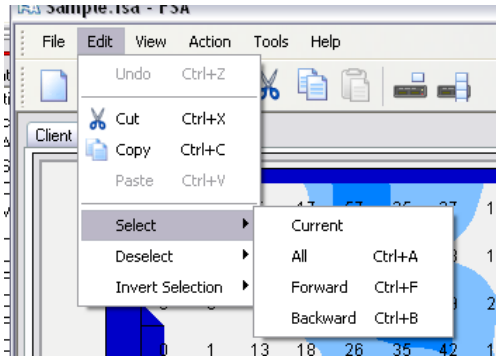
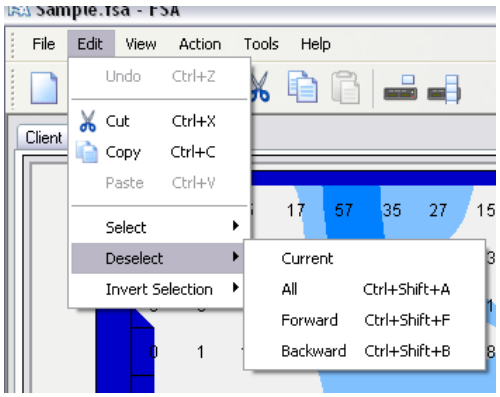
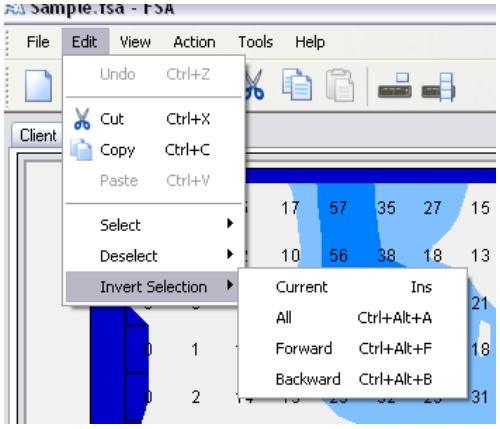
4.1.2.2 Menu Bar Edit

Tasks available under **Edit:**







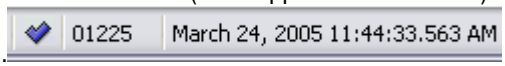
Edit-Undo: Undoes the last editing action performed (keyboard shortcut CTRL+Z).
Edit-Cut: Removes the selected text (from the Note Area or the Client Information tab) or FSA frames from the FSA software and places it onto the Windows clipboard. (keyboard shortcut Ctrl+X also see Toolbar Cut).
Edit-Copy: Copies the selected text (from the Note Area or the Client Information tab) or FSA frames from the FSA software to the Windows clipboard (keyboard shortcut CTRL+C also see Toolbar Cut.
Edit-Paste: Pastes the contents of the Windows Clipboard into FSA (keyboard shortcut CTRL+V also see Toolbar Paste).

- Textual data may be pasted into the Note Area or Client Information areas only.
- FSA Frames will be appended to the end of the currently open FSA file.

Edit-Select: Selects frames in the currently open FSA recording as per the parameters below.
Edit-Deselect: De-selects frames in the currently open FSA recording as per the parameters below.
Edit-Invert Selection: Inverts the selection state as per the parameters below.

Current: The currently displayed FSA frame .
All: All frames in currently displayed FSA file.
Forward: All frames from the currently displayed FSA frame forwards.
Backward: All frames from the currently displayed FSA frame backwards.

A Check mark will appear in the status bar to indicate the frame is selected (or disappear if de-selected).



FSA software offers full Windows® 'Cut and Paste to the clipboard' capability.

You will be able to **Cut, Copy** and **Paste** text into and from the Client Information page and/or in the Note Area, as indicated by the toolbar icons. This means you can paste existing text (*.txt) forms or questionnaires into these areas to make them a permanent part of that patient file. These areas can be updated at any time. Highlight (left click and drag your cursor then release) the text in your document or file with your left mouse button then select the desired action from the menu bar, tool bar or context menu.

Selecting **Cut** or **Copy** while a Recording tab is selected and a file open allows you to:
- copy or move(cut)a frame or frames of your FSA file and insert (paste) the copied frame or frames from FSA file

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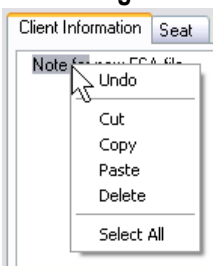
to FSA file or onto another recording tab.
- export the graphs or data into another software program that supports the format such as Microsoft Word (image), Microsoft Excel (data) or an image editor. Please refer to the section **Exporting Data** for how to export FSA data outside of FSA.

The Editing Context Menu



The editing actions **Undo**, **Cut**, **Copy** and **Paste** plus **Select All** are available from a context menu if your focus is on the Client Information tab or Note Area.

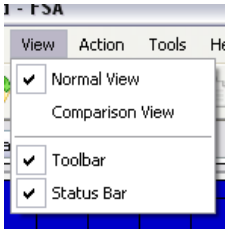
⇦ *The context menu that appears when focus is on the Client Information or Note Area.*

4.1.2.2.1 Context Menu Definition

Context menus are pop up menus that appear with a right mouse click, the menu that appears is dependant on where your focus is (what area of the screen you are on and where your cursor is when you right click), dependant on the context, in other words.

4.1.2.3 Menu Bar View

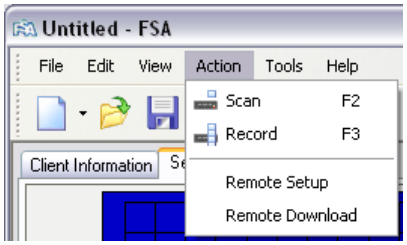
Tasks available under **View:**



View-Normal View: A checkmark indicates the default 'normal' view is selected.
View-Comparison View: Left click on Comparison View to elect to view four FSA frames from your current FSA file; a checkmark indicates the feature is on.
View-Toolbar: Left mouse clicking on Toolbar toggles the Toolbar on and off; a checkmark indicates the feature is on.
View-Status Bar: Left mouse clicking on Status Bar toggles the Status Bar on and off; a check mark indicates the feature is on.

4.1.2.4 Menu Bar Action

Tasks available under **Action:**



Action-Scan: Initiates the '**Scan'** function (or hit the F2 button at the top of your keyboard, also see Toolbar Scan).
Action-Record: Initiates the '**Record'** function (or hit the F3 button at the top of your keyboard also see Toolbar Record).
Action-Remote Setup: Brings up the Remote Setup window.
Action-Remote Download: Initiates the download of the data collected using the Remote feature.

*The option to adjust the remote read frequency is located at **Tools-System Settings** under **System**.*

NOTE: Make sure that you wait for the Windows 'Device Reconnect' 'beep when reconnecting the FSA interface module to your computer. If you are running thriugh USB (as opposed to Serial), you may have to wait a minute or so until the software is able to communicate and the data downloaded to the computer.

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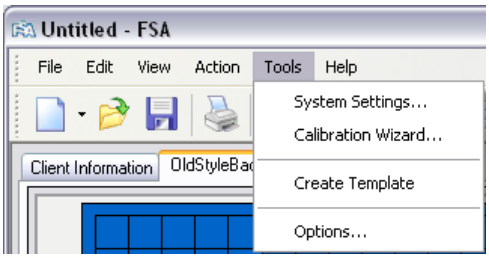
4.1.2.5 Menu Bar Tools

Tasks available under **Tools:**

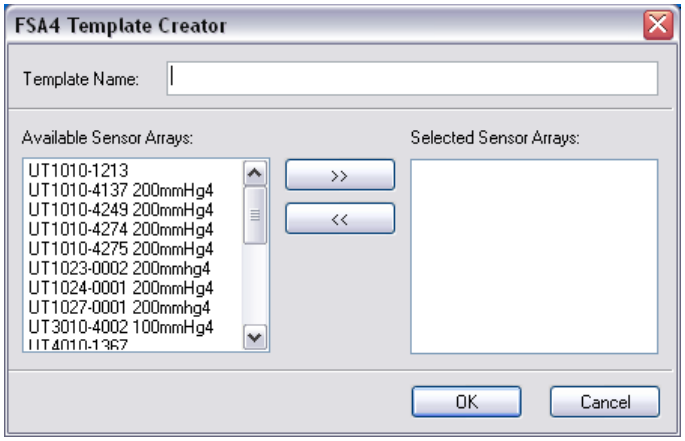


Tools-System Settings: Opens the FSA System Settings window.
Tools-Calibration Wizard: Opens the FSA Calibration Wizard.
Create Template: Opens the FSA4 Template Creator.
Tools- Options: Opens the FSA Options window where you can:
1- Change general program options.
2- Change the locations of your default FSA folders.

Click HERE ↑

HINT-you can also access System Settings by left clicking over the FSA system status information in the left side of your Status Bar.

4.1.2.5.1 Tools-Create Template



The Template Creator is a tool that enables the FSA user to create their own templates from their mats FSA 4.0 Sensor Array files.

1. Enter a name for your template.
2. Select the Mat's Sensor Array file you wish to create a template for.
3. Click the >> button
4. Repeat steps 2 and 3 if creating a multi-mat template.
5. Click OK.

Your new template will now be available for selection in your FSA Template directory, it will appear when you go to **File-New**.
Note that multi-mat systems may require use of a second interface module. 1 interface module can read up to 32 x 32 sensors (1 - 32x32 array or 2 - 16x16 arrays for example).

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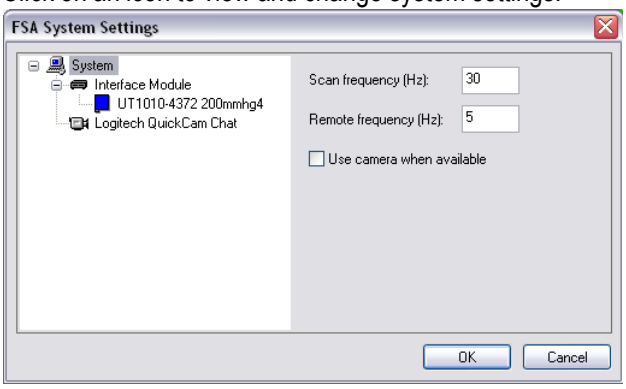
4.1.2.5.2 Tools-System Settings

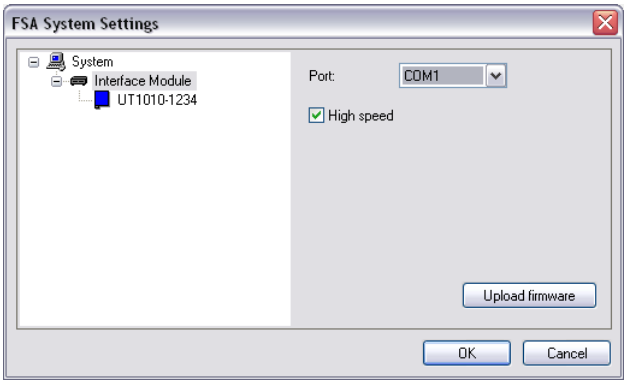
Click on an icon to view and change system settings.



Clicking on **System** will allow the operator to change:

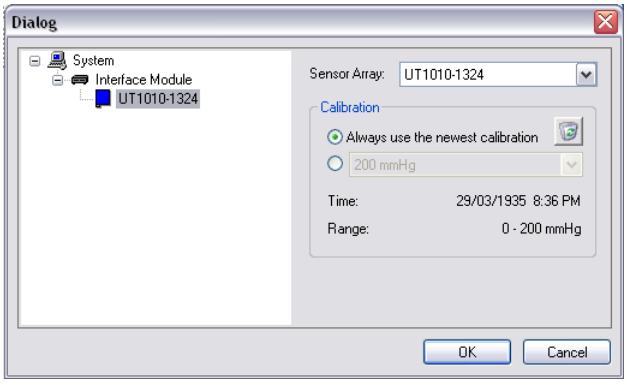
- the Scan Frequency in Hz (program default is 5).
- the Remote Frequency (scan rate) in Hz (program default is 5).
  1 reading per second = 1Hz
  1 reading every 10 seconds = 0.1Hz, etc.
- select or de-select **Use camera when available**.

Clicking on the camera icon will bring up your camera options see Adding Video



Clicking on **Interface Module** will allow the operator to change:

- the Port the Interface Module is connected to the computer through.
- select or de-select **High Speed** mode
- Upload Firmware when required (see 'Upload Firmware').



Clicking on the mat icon will allow the operator to:

- select the sensor array to use.
- select or de-select the option to **Always use newest calibration**.
- select the calibration range to use.
- delete the selected calibration. *You cannot delete the factory sensor array file's calibration*.

The Time and Range details for the currently selected file will appear below the calibration range dropdown.

4.1.2.5.2.1 Upload Firmware

You may need to Upload Firmware to your interface module after a software upgrade, or if your Interface Modules programming becomes scrambled. If you see a solid yellow light (the middle light on the front right) on your module, and restarting your computer, plus resetting your Interface Module does not clear it, you should do an Upload Firmware. This action will upload data to your FSA Interface Module from the FSA software.
Re-set your module after the process has completed by dis and re-connecting power to the module.

NOTE: If using a USB capable Interface Module (any of the Modules with a serial number containing a 'U'), do not perform an Upload Firmware unless running FSA 4.0 release 199 or up. If this has already occurred and you

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cannot clear the yellow light, upgrade your FSA 4.0 software from www.pressuremapping.com and perform an Upload Firmware using serial only, not USB. You may have to install the software on a computer with a serial port in order to do this. If that is not possible, please contact technical support at techsupport@verg.com. You may have to send your Interface Module in for reprogramming.

4.1.2.5.2.2 Scan Rate

The FSA computer interface module can read up to approximately 10 000 sensors per second when set to High Speed (see Tools-System Settings). Half of that when High Speed is not selected.

A typical 16x16, 256 sensor mat will read at approximately 40 hZ with High Speed selected.
10 000/256 sensors = 39 hZ.

To convert Hz (reads per second) into seconds per read, invert the number ;
e.g. 0.5Hz = 0.5 reads per second
1/0.5 = 2 seconds per reading
e.g. 0.1Hz = 0.1 reads per second
1/0.1 = 10 seconds per reading

To convert Hz (readings per second) into readings per minute, multiply by 60;
eg. 0.5 Hz = 0.5 x 60 = 30 readings per minute.
eg. 0.01 Hz = 0.01 x 60 = 0.6 readings per minute.

10 readings per second = 10Hz
1 reading per second = 1Hz
1 reading every 10 seconds = 0.1Hz
1 reading every 20 minutes = 0.05Hz
1 reading every 30 seconds = 0.0333Hz
1 reading minute = 0.0167Hz
1 reading every 10 Minutes = 0.0017Hz
1 reading every 30 minutes = 0.0006Hz
1 reading per hour = 0.0003Hz

High Speed mode should be de-selected when using a dual mat set up.

4.1.2.5.3 Tools-Calibration Wizard

The Calibration Wizard is a utility that will step you through calibrating your FSA mat. Please refer to Calibrating the Mat Step by Step for detailed instructions on calibration.

4.1.2.5.4 Tools-Options

Click on the **General** tab to select or de-select general program options.

- Choose to receive a warning before deleting frames.
- Choose to allow the software to automatically detect your hardware, which port your interface module is connected to, at FSA start up.

Click on the **Folders** tab to:

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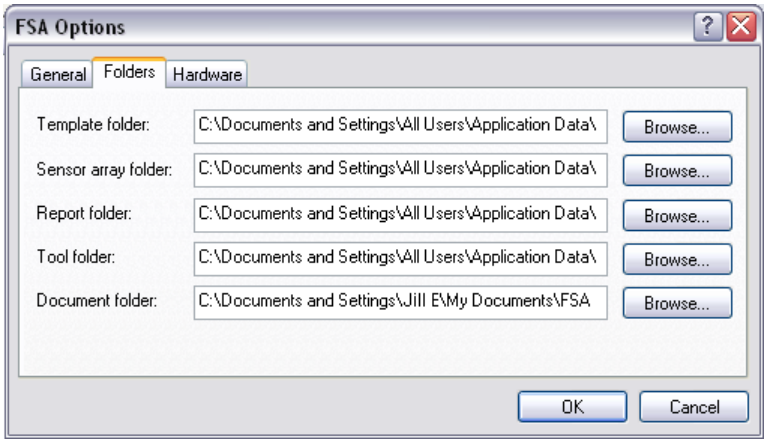
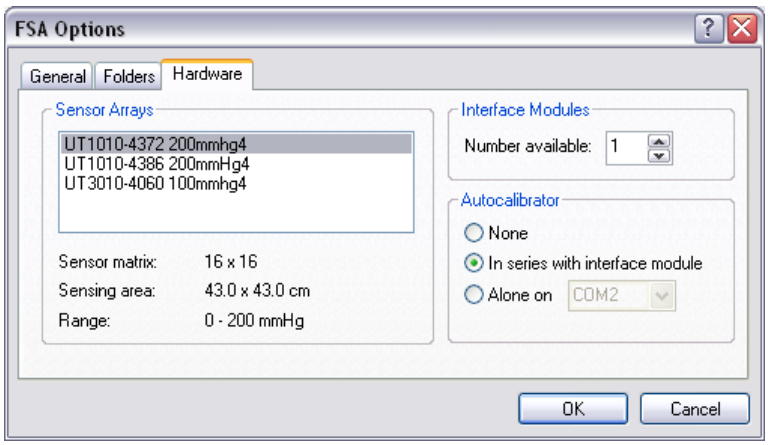


- Change the location of your FSA Template folder (default when running on Windows XP or Windows 2000 is C:\Documents and Settings\All Users\ApplicationData\Verg\FSA\4.0\Templates)
- Change the location of your FSA Sensor array folder (default when running on Windows XP or Windows 2000 is C:\Documents and Settings\All Users\ApplicationData\Verg\FSA\4.0\SensorArrays)
- Change the location of your FSA Document folder (default when running on Windows XP or Windows 2000 is C:\Documents and Settings\'YOUR USER NAME'I\My Documents\FSA)
- Change the location of your FSA Print Report folder (default when running on Windows XP or Windows 2000 is C:\Documents and Settings\All Users\ApplicationData\Verg\FSA\4.0\Reports)
- Change the location of your FSA Tools folder (default when running on Windows XP or Windows 2000 is C:\Documents and Settings\All Users\ApplicationData\Verg\FSA\4.0\Tools)

New features such as Tools are slated to show up in future releases of FSA. These may require their own folder, that folder will be added when required by future software updates.

4.1.2.5.4.1 Tools-Options-Hardware



Click on the **Hardware** tab to:

- View the Sensor Arrays installed on your computer, as well as their array size, sensing area and calibrated range.
- Choose the number of interface modules you will be using. This may be required if using two high resolution (over 16 x 16) FSA mats together, for example, a seat and back..
- Configure your optional FSA Autocalibrator.

Also see The FSA Autocalibrator.

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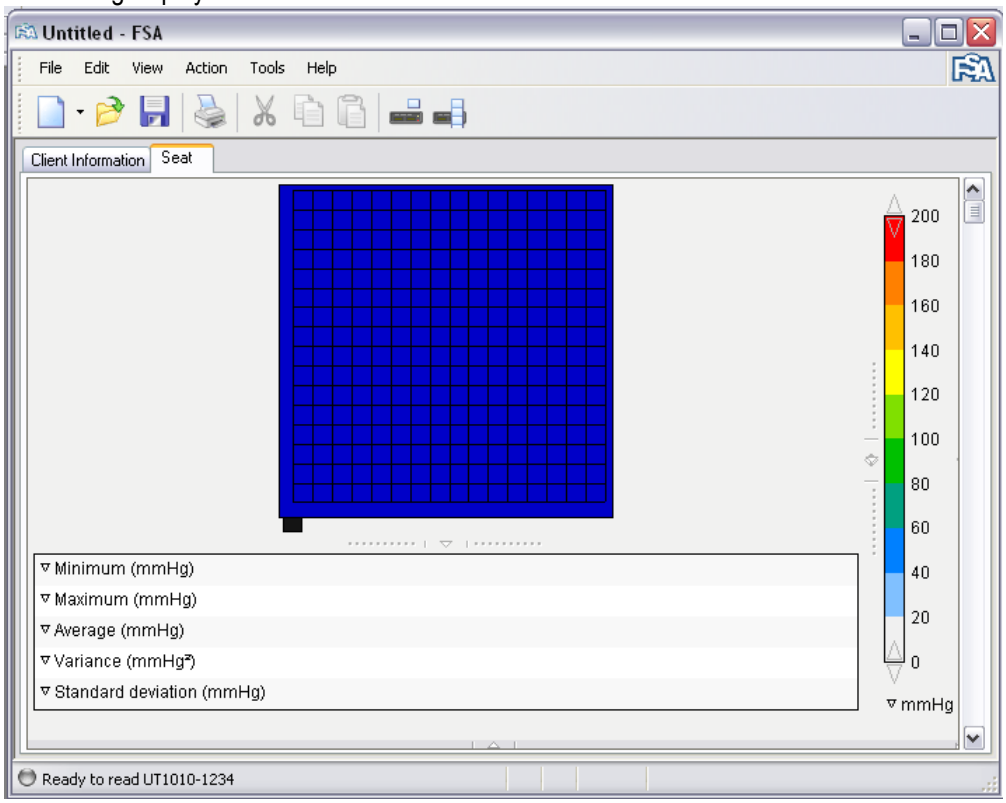
4.1.2.5.4.2 Templates

Templates are *similar* to what used to be called a configuration or scheme in older versions of FSA - like configurations, your mat requires a template to allow the FSA operator to display the data collected from the FSA hardware. The template collects hardware information from FSA 4 sensor array files (*.cal) such as the array size and calibration units and creates a suitable template.

You can create and save your desired display settings as a new template. You may want to do this if you have set up a particular set of display options that suit your application and you would like to use that setting consistently. While you can certainly select the default template and make display adjustments every time you use the software, it would save time and provide consistency to save your preferred display options so you can repeat them each time you pressure map. For example, you may want the Surface and Time plots off on your Seat display. The resulting display...



...may be saved as a template as follows:
Make desired display adjustments to suit your application (refer to the section Your Main FSA Display Area for how to achieve this).

- Click **Save.** The 'Save As' window will open.
- Change your 'Files of Type:' drop down at the bottom of your Open window to show '*.fsa and '*.cal' files and not only FSA Documents (*.fsa') if that is all you are seeing.
- Browse to your FSA4\Templates directory from the Save In: drop down
- Type a name for your Template in File Name: this name will appear in your 'File-New' dialog and Toolbar-New dropdown.
- Click **Save**.

You can save an existing FSA file with data as a Template as well, but you will want to remove the data from the file (refer to Menu Bar Edit) and **Save As** (NOT **Save**) into the Templates directory.

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Also see Tools-Create Template

4.1.2.6 Menu Bar Help

Clicking **Help-About FSA** will give you the software version you are running. You may need to know this if contacting FSA Technical Support, or searching for help at www.pressuremapping.com.

4.1.3 The FSA Tool Bar

Click on a button to initiate an action.

4.1.3.1 Toolbar Open

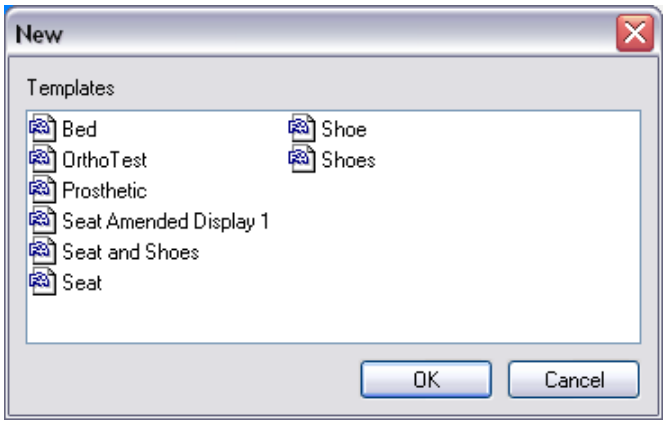
Clicking the **Open** button will bring up your default FSA Documents window and allow you to open and existing FSA file. Select the file you wish to open, then click **OK** Also see the Menu Bar File-Open.

4.1.3.2 Toolbar Save

Click on the **Save** button to save any changes made to your file since the last save. If saving for the first time, the Save As window will open in your default FSA file directory , prompting you to name the file. Type a name in the 'File name:' window then click **Save**.
You can save the files as they are, or, save an FSA (*.fsa) file as a Template, to achieve this refer to Templates.
Also see Menu Bar File-Save.

4.1.3.3 Toolbar New

Starts a new FSA file.
The templates tab will NOT open using the toolbar button, if you want to access the templates use **File-New** or click on the dropdown arrow to the right of the **New** button (as shown below)



Example left indicates templates that may be available in your software. Clients can create their own custom templates, see Templates.

Select the kind of document you will be making (mat type you are using), and click **OK**.

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OR

Click on the dropdown arrow to the right of the **New** button. This will bring up a textual representation (left) of the Templates tab. You may select your type of document (mat type) here.
*NOTE: To DELETE a Tab/Recording, select the tab/recording and select **File-Delete Recording***

4.1.3.4 Toolbar Cut

Click on the **Cut** button to remove the selected text or FSA frame from the FSA software and paste it to the Windows clipboard. Also see Menu Bar - Edit-Cut. The text or image can then be pasted into compatible software (a word processor, spreadsheet or image editor for example).
NOTE: You cannot CUTor DELETE a recording tab at the time of the writing of this manual.

4.1.3.5 Toolbar Copy

Copies the selected text or FSA frame from the FSA software to the Windows clipboard. Also see Menu Bar Edit-Copy. The text or image can then be pasted into compatible software (a word processor, spreadsheet or image editor for example).

4.1.3.6 Toolbar Paste

Pastes textual data previously copied or cut to the Windows clipboard into your Client Information or Note Area
or
Pastes copied or cut FSA frames currently on the Windows clipboard into an FSA file.Also see Menu Bar Edit-Paste.

4.1.3.7 Toolbar Scan

Initiates the Scan function (or hit the **F2** button at the top of your keyboard) also see Menu Bar Action-Scan.

4.1.3.8 Toolbar Record

Initiates the Record function (or hit the **F3** button at the top of your keyboard) also see Menu Bar Action-Record.

4.1.3.9 Toolbar Print

Initiates the Print function also see Menu Bar File-Print.

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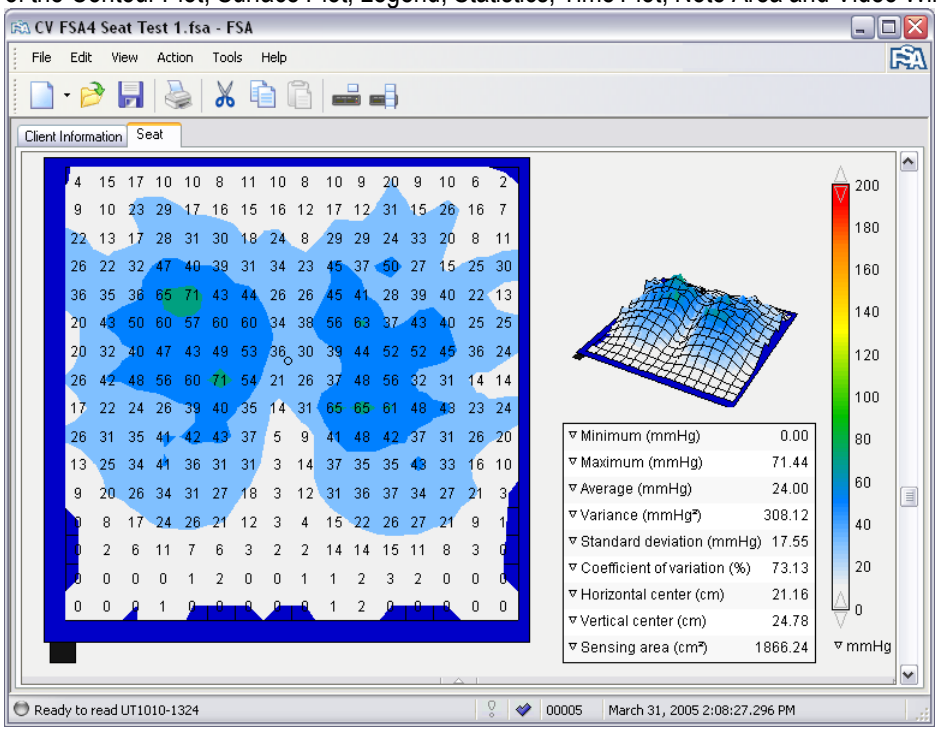
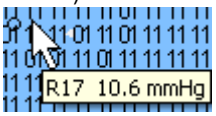
4.1.4 Your Main FSA Display Area

Please take a few minutes to familiarize yourself with the main FSA display area. The main display area consists of the Contour Plot, Surface Plot, Legend, Statistics, Time Plot, Note Area and Video Window.



- Choose to show or hide display panels by left mouse clicking on the 'Collapse Arrow' appearing in the centre of the splitters between each display panel.
- Re-size the individual display areas by left mouse clicking and dragging on the 'grippers' (dotted lines) in the splitters between each panel.
- Re-arrange your display with a right click over the panel you wish to change and selecting a different panel from the context menu that appears. If you want to see the 'Statistics' panel displayed where the 'Time Plot ' is for example, right click over the 'Time Plot 'area and select 'Statistics' (note that the 'Time Plot ' panel is hidden by default).
- 

Hovering the mouse pointer over the numerical values displayed in the Contour Plot will trigger a Tool Tip pop up that will give you the value of the cell beneath to 1 decimal place.
- A right mouse click over any of the four display panels will bring up a context menu specific to that panel. Left mouse click on an option to select.
  - **Cut, Copy** and **Paste** if available are explained earlier in this manual (see Menu Bar-Edit).
  - **Flip** will give you a mirror image of the both the 'Contour' and 'Surface' plots.
  - You can change how the colours are displayed in your plots by selecting either **Show Contours** or **Show Color Blocks** (note that you can also toggle the display option **Blended Colors** by a left mouse click on the Legend colour bar). Examples here.
  - You can toggle the display of the numerical data on or off by toggling between **Show Values** and **Hide Values.**

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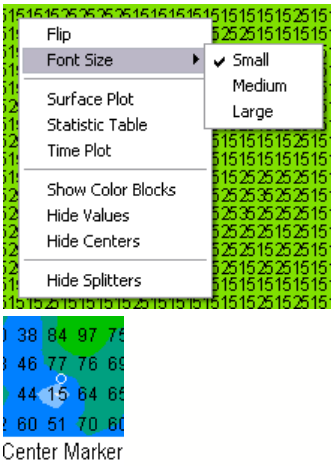
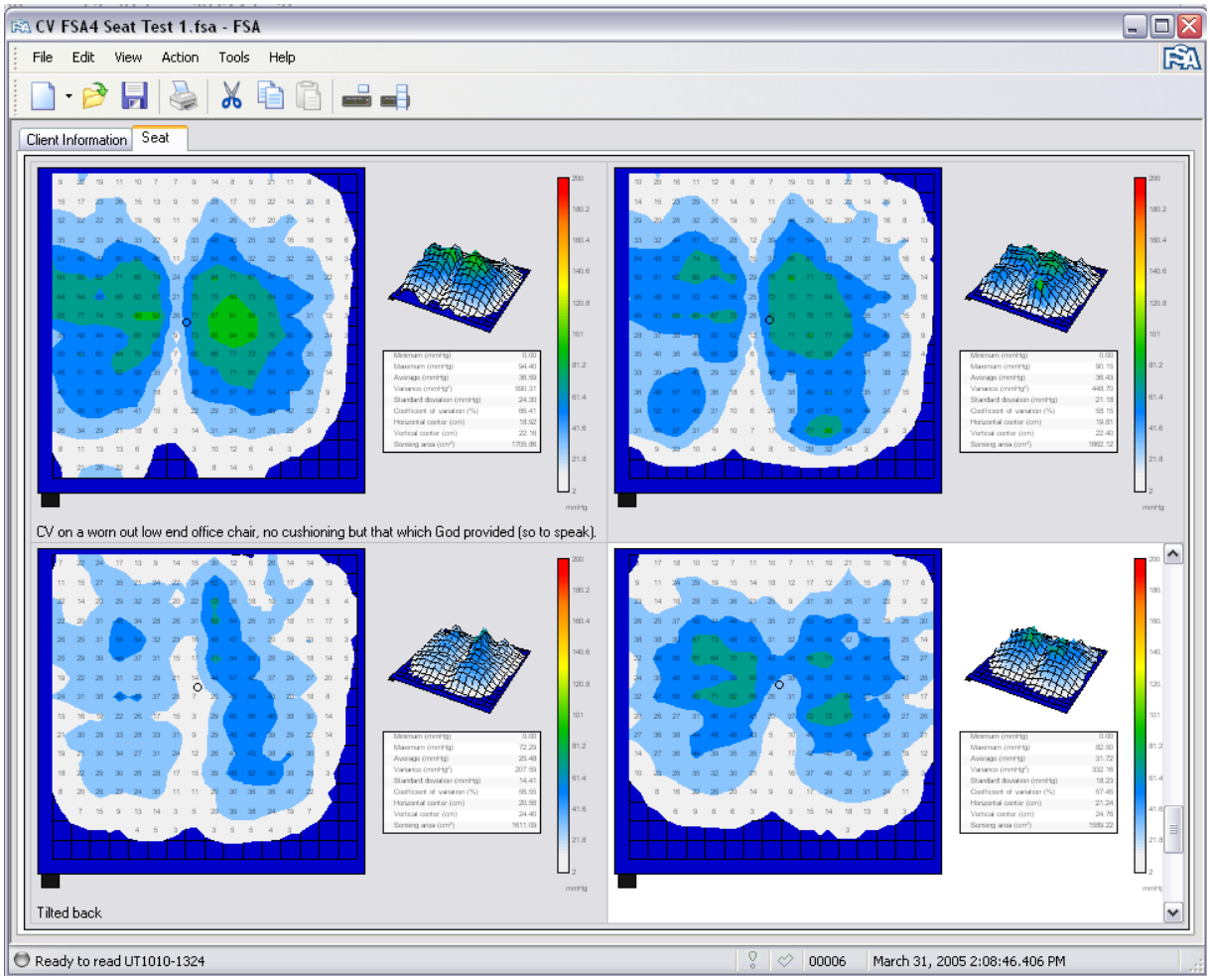


The font size in the FSA display (there is text and/or numbers in all but the Surface Plot) can be adjusted in the context menu from the default Small, to Medium and Large.

You can toggle the display of the Center marker (a small white circle) on or off by toggling between **Show Centers** and **Hide Centers.**

4.1.4.1 Comparison View


CV FSA4 Seat Test 1.fsa - FSA
File Edit View Action Tools Help
Client Information
Seat
CV on a worn out low end office chair, no cushioning but that which God provided (so to speak).
Tilted back
Ready to read UT1010-1324
00006
March 31, 2005 2:08:46.406 PM

The Comparsion View allows the FSA operator to compare different frames in a single file. Select a quadrant by left mouse clicking on it. The Scroll bar will appear. Scroll through to select a frame, select the next quadrant, scroll through to select another frame and repeat in the third and fourth quadrants to compare frames side by

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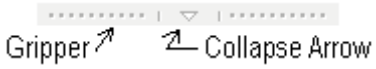
side. The currently selected quadrant will have a white as opposed to gray background, in above example, it is the quadrant in the lower right. That frame is active;

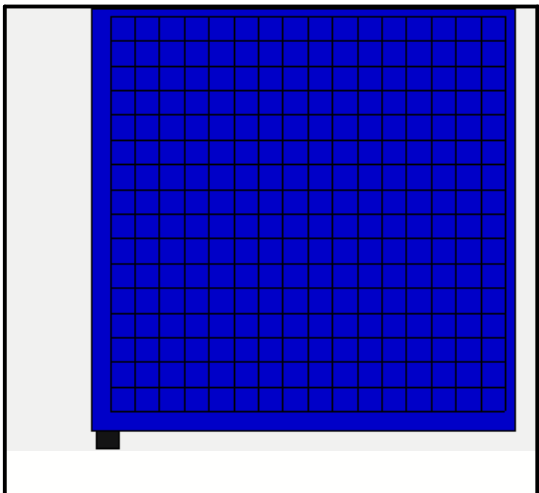
- if you initiate a scan, the selected quadrant will be 'live'.
- you can scroll through frames in the selected quadrant, as you would in a normal view, with the scroll bar or mouse wheel.
- changing display options is not available in Comparison view, you must be in Normal view.
- only 1 line of any text in the 'Note Area' will be visible in Comparison view.

4.1.4.2 Splitters

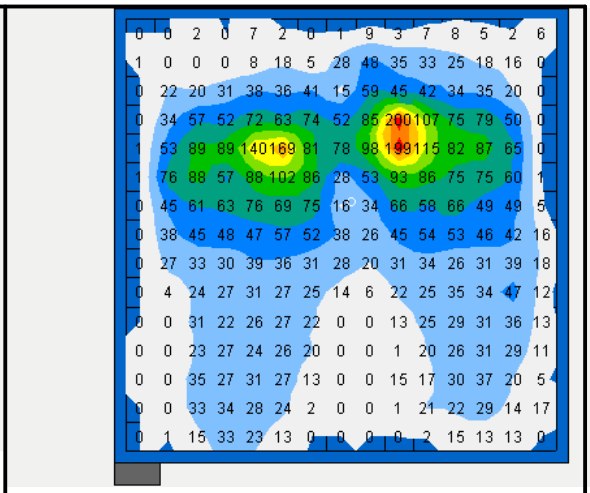


Splitters are the visual dividing lines between each display panel, and are hidden by default.
To show splitters, right click anywhere over your main display area and select 'Show Splitters' from the context menu that appears. Conversely, if you wish to hide them, right click to pull up the context menu and select 'Hide Splitters'.

4.1.4.3 The Contour Plot



Example of the Contour Plot, Seat template selected, with no data collected.

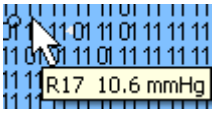


Example of the Contour Plot, a frame from a seating evaluation file.

The Contour Plot is a 2D, colour display of your sensing array data. It also shows your numerical pressure values if that option is selected. Also see Display Option Examples.

By default, the data collected during your pressure mapping session will include the entire array, which includes 0 values as indicated in the example above. Likewise, the Sensing Area (cm²) statistic will include the entire array. You may want to change the bottom of the scale to .1 instead of the default 0 to remove the values up to .1 from displaying in your graph and being included in your data (in above example the default of 0 is selected, see all the 0's). Also see The Legend Display Panel.

Run your mouse without clicking over the Contour Plot with an FSA file open. A tag will appear indicating what cell you are over with the pressure value of that cell, to 1 decimal place.



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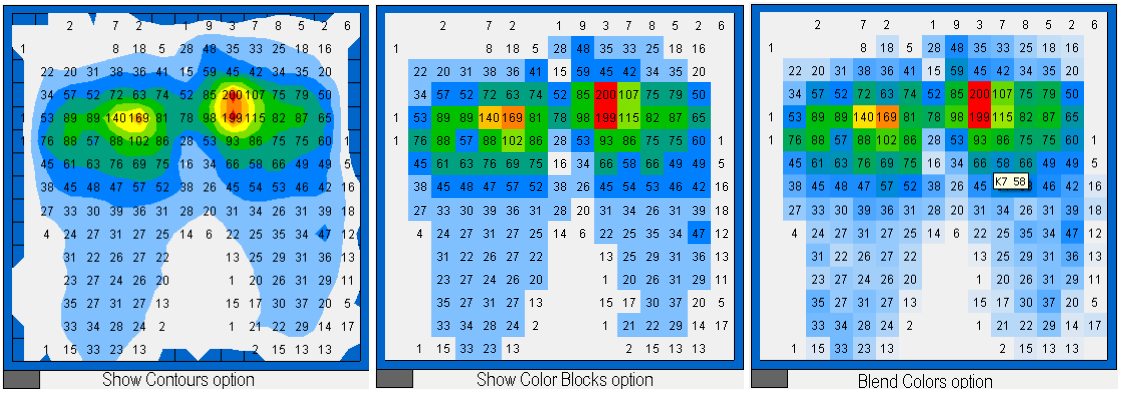
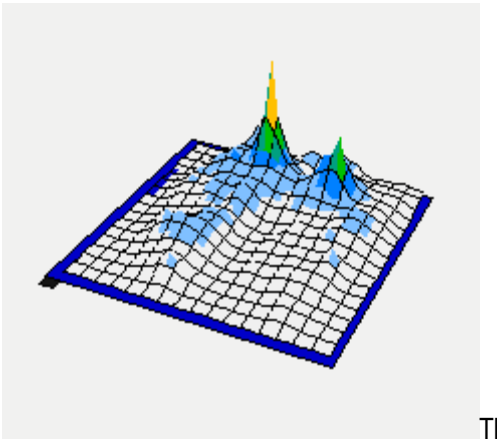
4.1.4.3.1 Display Option Examples



Above are examples of the same frame with the display options changed. The actual numerical data is not affected. Note that 'Blend Colours' only affects the 'Contour Plot' when the 'Show Colour Blocks' display option is selected.

4.1.4.4 The Surface Plot



The Surface Plot provides a 3 dimensional view of your subject on the sensing mat. You can change the orientation as follows:
Left mouse click and drag at any corner to rotate the mat. This will also rotate the surface plot.
Click SHIFT and left mouse click and drag to change its vertical display angle.
Holding down CTRL and clicking on the Legend colour bar will toggle blend colours off and on.

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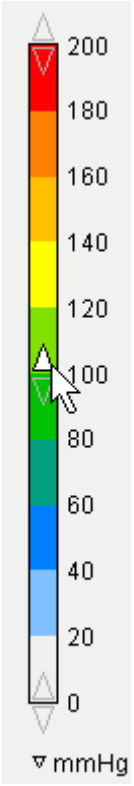
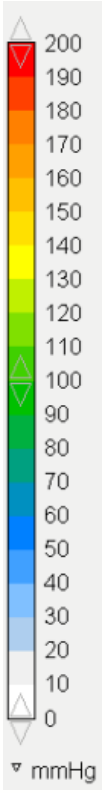
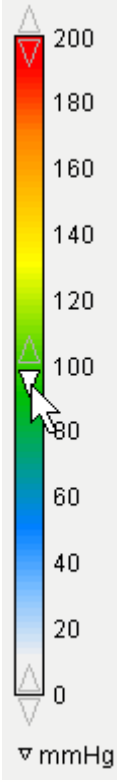
4.1.4.5 The Legend Display Panel



Default color bar - 10 colors



Color Bar with 20 colors

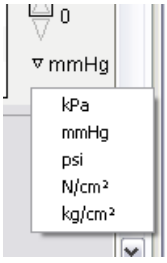


10 Color bar with blend colors on

The Legend shows you the calibration units (in this example mmHg), range (in this example 200) and color bar associated with the loaded file.

- Clicking on the color bar will cycle through the available bar color sets as follows: 10 colors - in color, 20 colors - in color, 10 shades of gray white at the bottom, 20 shades of gray white at the bottom, 10 shades of gray black at the bottom, 20 shades of gray black at the bottom.
- Hold down the CTRL key and left mouse click on the color bar to toggle between blended and non-blended colors on the color bar as well as in the Contour and Surface plots. The Blend option will only affect the Contour plot if the display option Color Blocks is selected.
- Adjust your Display Range Values by left mouse clicking on the arrows at the top, bottom and center of the color bar. This changes the display only not the data already collected and saved in a file. By default:
  - clicking the arrows at the top of your scale will increase/decrease the top of the range by 10 units
  - clicking the arrows at the bottom of the scale increases/decreases the bottom of the range by 1 unit.
  - Clicking SHIFT while you adjust the ranges will adjust the top by increments of 1 unit. and the bottom by .1 unit increments..
  - Clicking the UP or DOWN arrows in the center of the colour bar will raise or lower the entire range in increments of 1 (or by .1 with the SHIFT key engaged).
  - Change your units by left mouse clicking on the arrow beside the units currently in use and selecting another unit. Changing the units will automatically convert the displayed values - there is no need to recalibrate your mat.

HINT: you may want to increase the bottom end of your scale slightly as sensors reading 0 will display, and the statistic 'Sensing Area' will include all 0 values as being part of the area.



Select either:

- kilopascals
- millimeters of mercury
- pounds per square inch
- newtons per square centimeter
- kilograms per square centimeter

The software automatically converts the values for you.

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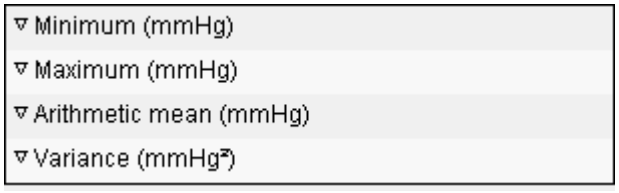
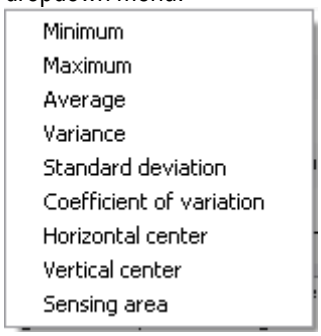
4.1.4.6 The Statistics Display Panel



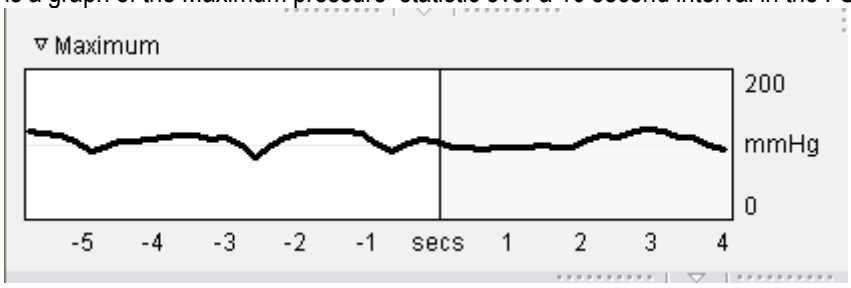
The default Statistics panel. When you collect data, values will appear aligned to the right of the panel, in black. When you select a sub-section of the mat (see Statistics-Selectable Areas), the statistics from the selected area will appear in blue which corresponds to the colour of the outline of the selected area, a third section will appear in another contrasting colour, and so on.

Adjust the size of the statistics panel by left mouse clicking on and dragging the splitters (the dotted lines) dividing it from adjacent display sections. For more detail on this procedure see The Surface Plot and Contour Plot Displays. You can opt to display or hide any display section by clicking on the arrow in the center of the splitters. Customize the order in which your statistical data displays by clicking on the down arrow to the left of the statistic, and selecting another. A dropdown menu will appear (example below) Statistics available to include/the statistics dropdown menu:



4.1.4.7 The Time Plot Display

The time plot field will provide you with a graph of the selected statistic over a 10 second interval. Example below is a graph of the Maximum pressure statistic over a 10 second interval in the FSA file selected.



- To select a different statistic, click on the dropdown arrow beside the label - in this example Maximum - at the top left of the Time Plot field and choose another statistic.
- The X axis always indicates 10 seconds, as described below; it can be 5 seconds before and 5 seconds after the currently selected frame, or anything in between, but at this time the interval will always be 10 seconds. This may change in future software releases.
- The Y axis values and units are dependant on the statistic selected for graphing. In the above example, the values are from 0 to 200 and in mmHg as this is the currently displayed range and units. Adjusting your view range and units in the 'Legend' field will adjust your Y axis values accordingly (see The Legend Display Panel).
- The vertical bar in the graph indicates the currently selected frame. When your cursor hovers over the vertical bar a resizing arrow appears. ↔ Left click and drag left or right to adjust what ten second interval is being displayed; in the example, the plot is from 6 seconds prior to the current frame to 4 seconds after.

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- If you do not see the vertical bar, it is dragged fully to the right or left of the graph. Hover your cursor over the right or left border, if you see the resize arrow, you have found your bar. Left click and drag it to the position you want.

Remember the time plot indicates a 10 second interval - if you do not see a graph, check the time stamp of your frames in the status bar of your FSA window. It likely is that the frames do not cover a 10 second interval, or are more than 10 seconds apart.
The Time Plot field is collapsed by default when you install FSA.

4.1.4.8 The Note Area

Upon stopping a scan, a cursor will appear in the 'Note' area at the bottom of your FSA4 window and text can be typed. This text is always associated with the frame in view. Text cannot be typed until the first frame has been recorded, the Note Area will be greyed out.
It is recommended that the conditions and variables of the frame be described for reference; for example, the type of cushion, positioning etc.
To edit the text in the Note Area:

- left mouse click and drag over the text you wish to remove to highlight it.
- right click and select **Cut** from the context menu that appears (or **Edit-Cut** in the FSA Menu Bar)

The cut text will be removed from the Note Area and placed on the Windows clipboard. The cut text can be pasted into another FSA frame, or into another software program.

4.1.4.9 The Video Window

If the option **Use Camera** is selected from **Tools-System Settings**, the video will appear in the Video Window in the lower right of your FSA display, to the right of the Note Area and below the Statistics and Legend (see Adding Video).

- To resize the Video Window, click and drag the horizontal dividing bar between the Video Window and Note Area, and the Contour Plot and Statistics areas.
- To close the Video Window, click on the arrow on the vertical bar dividing it from the Note Area.
- **Cut**, **Copy** or **Paste** the image in the Video Window by right clicking over the Video Window and selecting the desired option from the context menu that appears. The image will be copied to the Windows clipboard and can be pasted into another FSA frame, another FSA file, or third party software that accepts a bitmap from the Windows clipboard (an image editor, a word processor, etc.).

4.1.4.10 Scroll Bar

Move forwards and backwards through frames in your file by either:

- left mouse clicking on the up or down arrows in the scroll bar
- left clicking and dragging on the scroll bar 'button' located on the right hand side of your main FSA display area.
- ALT+ ⇧ or ⇩
- roll the wheel on your mouse.

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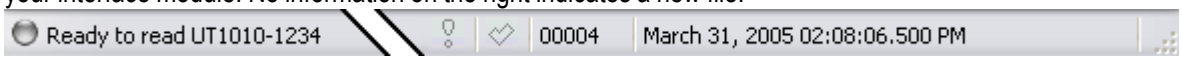
4.1.5 The Status Bar

The FSA Status Bar reports the FSA system status, along with other information, as follows:

Above indicates the system is ready to read and start a new file, and a sensor array (calibration) selected from **Tools-System Settings**. If you own more than one mat, verify the serial number matches the mat plugged in to your interface module. No information on the right indicates a new file.



Above indicates system ready to read using the sensor array indicated. The information on the right indicates an existing file is selected and ready to be added to. The exclamation mark and checkmark outlines will appear in an open file, but not a new file that has yet to be saved. They are the Key Frame and Selected Frame indicators. Click on the outlines to select or de-select also see Menu Bar-Edit. and Key Frames.

Above indicates that there is no sensor array (calibration) file available for the selected template in your SensorArray directory.

Above indicates there is a communication error of some sort.

Above indicates the **Record** (F3) function is engaged. The frame number (in this example 00036) will be changing as what you are viewing live is being recorded. The time will be advancing.

Above indicates the **Scan** (F2) function is engaged. The frame number (in this example 0009) will not change as what you are viewing live will not be saved as is the case with **Record**. When you disengage the scan, the last image you see will become the newest frame (in the example, 0009) in the file. The time will be advancing.

Clicking in the left side of the Status Bar will bring up your 'System Settings' Dialog, also available from Tools-System Settings.
The format that the time and date display are dependent on the 'Regional and Language Options' settings found under your Windows Control Panel.

4.1.5.1 Key Frames

The ability to mark frames as Key Frames is new to FSA 4. A Key Frame is not the same as a Selected Frame, the latter option is intended to be used in editing operations. The option was developed to allow the FSA operator to mark specific frames in a file containing a high number of frames, typically a file that was collected using the **Record** and not the **Scan** function, and quickly view just those frames instead of going through a large file frame by frame searching for key information.

- You can mark a frame as a Key Frame manually by clicking the exclamation mark outline in your Status Bar in

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whatever frame or frames you like. The exclamation mark will be red if selected.
To view only your key frames:

- Hold down the CTRL key and scroll through your FSA file using the wheel on your mouse (if you have a wheelmouse), the UP and DOWN arrows on the scroll bar on the right side of your colour bar or by hitting the ⇧ or ⇩ keys on your keyboard. Only the frames selected as key will show.
- If you release the CTRL key, all frames will show.

A red exclamation mark will show in the FSA Status Bar if a frame is selected as a Key Frame.

As of the writing of this manual, FSA automatically marks as 'Key' the final frame recorded when the **Record** function is disengaged, or any frames collected using the **Scan** function. This default setting will be made optional in a future release of the software., please keep an eye on **Tools-Options, General** in future software releases or contact techsuport@verg.com for further information.

4.2 Remote FSA

Remote reading adds flexibility to the FSA tool by permitting interface pressure measurements to be made with the interface module disconnected from the computer. This feature is useful to the user in situations when it is desirable to test the client in situations where the computer cannot be transported, such as in a moving vehicle, or when testing a client over a prolonged period of time.

Briefly, the interface module is programmed to take pressure measurements at user selected preset time intervals. The interface module is then disconnected from the computer. The remote readings are initiated and stored in the interface module. The interface module is reconnected to the computer and the data is transferred into the computer.

The interface module stores 114,600 individual sensor reads.

The maximum number of frames the interface module stores per remote session is a function of the number of sensors in the mat. Examples:

An UltraThin Seat mat has 256 individual sensors:
16 x 16 = 256
114,600 / 256 = 448
The interface module can store 448 Standard Seat mat frames.

An UltraThin Bed mat has 1024 sensors:
(32 x 32 = 1024)
114,600 / 1024 = 112
The interface module can store 112 Standard Bed mat frames.

IMPORTANT: Switch your power source from AC to battery before setting up the remote session, if the energy supply is disrupted after presetting the interface module, the preset remote reading instructions are lost.
Once data has been collected to your module, you are able to disconnect power from the module without data loss for 48 hours. Additional reads can not be recorded or stored once the power supply has been disconnected from the interface module.
Do not have both 9V and AC power supplies plugged in together, damage to the components may result.

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FSA interface modules are available with an extra 4 MB of memory, which increases the number of frames the module is able to store. Please contact your distributor if you require further information.

4.2.1 Remote Setup

Remember to switch your power source from AC to battery before setting up the remote session.

1. Plug the battery pack into the PWR port on the rear of your FSA Interface Module.
2. Go to **Tools-System Settings** to set your remote frequency. Click **OK**.
3. Go to **Action** - **Remote Setup** in the FSA menu bar.
A message will appear telling you 'The interface module has been setup to take remote readings. It is capable of recording up to XX frames', where XX is the number of frames possible using your mat and interface module combination.
4. Disconnect the FSA cable (serial or USB) from the rear of your interface module. You are ready to collect data. All functions are disabled except the ability to read remotely. The red light is off and will re-illuminate when the interface module is triggered on or off.

You can trigger the Interface Module to read by depressing either the white 'Trigger' button on the rear of your Interface Module, or by clicking the red button on the FSA1040 Manual Trigger. The latter connects to the port labelled PC on the rear of your Interface Module.

If the red light begins blinking when the manual trigger is plugged in, depress the switch to stop the data acquisition.

5. Press either trigger to start recording. The red light flashes on the black box at the frequency set by the user. Press the trigger again to stop.
6. Repeat step 5 until the data gathering is complete, or the maximum number of frames is stored in the interface module. The continuous illumination of the red light indicates a full interface module, and no additional frames can be recorded.

Once remote recordings have been made they are stored in the interface module's memory for up to XX hours, without the module being powered.

4.2.2 Remote Download

1. Reconnect the FSA cable to the interface module (disconnect the FSA 1040 Manual Trigger Cable first, if required).
2. Disconnect the battery pack and reconnect the AC power.
The IM should be powered by the AC-adapter while downloading, particularly when downloading large amounts of data.
3. Select **Action-Remote Download** from the FSA Menu bar.

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4. To begin another remote session, start again at 'Remote Setup' step 1.

If you are using the USB cable, the download may not start. To avoid this, shut your FSA software down when you disconnect the Interface Module to collect your data, and start it up again when you return to your computer to download. If you did not shut your FSA software down, you can also click on the Client Information tab, then back on your recording tab.
Each time the interface module is triggered on/off (by pressing the red button on the manual trigger), a full red screen (i.e. a frame with all sensors at maximum), also known as a 'bookmark' appears, automatically separating remote recording sequences. This allows the FSA user to correlate an activity with a FSA read(s).

4.3 Adding Video

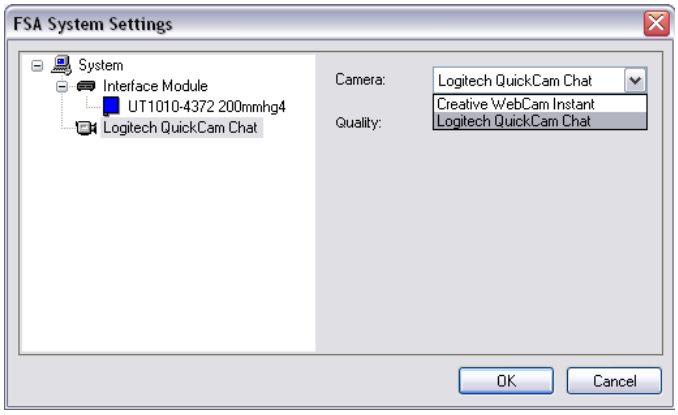
To turn the camera/video function on or off:
- Go to **Tools-System Settings**

Your camera should appear in the hardware tree. If it does not, make sure it is connected to the computer and is properly installed.
- Click on the **Use Camera if available** checkbox to select or de-select the function.
- Click **OK.**

*Stop the **Scan** (R2) or **Record** (F3) function if running before going to **Tools-System Settings** to turn your camera on or off.*

To adjust the video settings for your camera:
- Go to **Tools-System Settings**
- Click on your camera in the hardware tree.
- Select a different camera from the 'Camera:' dropdown, if you have more than one connected to your computer.

or
- Change your video quality settings from the 'Quality:' dropdown.
- Click **OK.**



Selecting a different camera from the 'Camera:' dropdown

Drag and Drop images (*.bmp, *.jpg, *.jpeg) from within Windows Explorer, My Computer, your Desktop, into your FSA file video window.
To Drag and Drop:

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- Press and hold down the button on the mouse to "grab" the image file.
- "Drag" the image file/cursor to the FSA video window
- "Drop" the image by releasing the button.

There must be an FSA frame open in order to Drag and Drop an image into it, you cannot drag and drop an image into an empty file.

Cut, Copy or **Paste** the image in the Video Window by right clicking over the Video Window and selecting the desired option from the context menu that appears. The image will be copied to the Windows clipboard and can be pasted into another FSA frame, another FSA file, or third party software that accepts a bitmap from the Windows clipboard (an image editor, a word processor, etc.)

Notes:
The camera you select must be able to stream video, that leaves out most digital cameras. The ability to record video does not equate to streaming video (however you can still drag and drop digital images into your FSA file). Look for a Webcam style camera to use with the FSA system. If you need suggestions please contact techsupport@verg.com
For optimum results when using FSA with video, we strongly advise that you have at least 128MB of RAM, the more the better. FSA files with video included can be 10 or more times larger than the same file without video. FSA 4 software is optimized for Windows XP - we strongly suggest that you be running on Windows XP is you plan on using the Video feature frequently. In house testing has found Video on Windows 98 to be unstable.
The Quality settings available under the 'Quality:' dropdown depend on your camera. To keep the file size manageable, we suggest you select the lowest resolution available initially, and try it out.
If you have copied an image to the Windows Clipboard and cannot Paste it into the FSA Video window, click in the FSA video window to make sure your cursor focus is in that window. If the Paste option is grayed out, the image format is not compatible.

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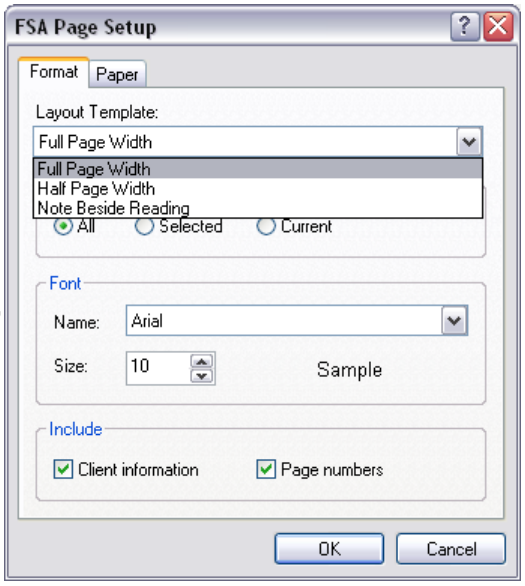
4.4 Printing Reports

Initiating the print function directly from the 'Print' button in your toolbar (or **File-Print** from the FSA Menu bar or keyboard shortcut **CTRL-P**) will produce a report using the current default settings (if you have not used the feature before), or the last print settings used. To preview your printed report, select **File-Print Preview** from your FSA Menu Bar.

To customize the report:

1. Go to **File-Page Setup**. The FSA page Setup dialog apears (right).
2. Select a report style from the 'Layout Template:' dropdown (dropdown is open in example).
3. Choose to include **All**, **Selected** or **Current** frames.
4. Select a font style and size.
5. Choose to include 'Client Information' and/or 'Page numbers'.
6. Click the 'Paper' tab to choose paper size and source, Margin size and orientation (these options are also available directly from **File-Print, Properties**).
7. Click **OK**.



HINT: Do a Print Preview to make sure your report is what you want before initiating the print.

Clicking the **Print** button in your toolbar or selecting **File-Print** from the FSA Menu bar (or CTRL-P) will bring up your Windows 'Print' dialog box. In this window you can choose the printer you wish to use, the number of copies you wish to make and the pages you want to print (all, pages or a selection). Clicking the **Properties** button allows the user to make changes to the printer properties (some of the options offered are dependant on the printer you have installed and selected).

NOTE: Different templates will be made available in the upcoming months. Please check with FSA Technical Support at techsupport@verg.com or at www.pressuremapping.com.

4.5 The Client Information Tab

Enter client / file specific notes here, such as name, date of birth, relevant medical history, etc.

You can create a form by typing or pasting in what you would like to appear on all your Client Information tabs for one or all of your document templates, and saving it as a template(save it in to your FSA4\Templates directory).

Example:

- Open a '**Seat**' document (template) from **File-New**.
- Click the 'Client Information' tab.
- Type:

  Name: _____

  Address: _____

  _____

  Phone: _____

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- Click **File-Save As**
- Save the file in your FSA4\Templates directory

When you next open 'Seat' from **File-New**, you will see that the Client Information tab will contain the information you typed in.

4.6 Exporting

4.6.1 What can be exported from the FSA Program

Export FSA data, numerical or graphical, to any external programs that support bitmap (BMP) or enhanced metafile(EMF) formats for graphical, or CSV (Comma Separated Values) for data.

4.6.2 Selecting Frames

- To select a frame, go to your FSA Menu Bar options **Edit - Select, Edit - De-select** or **Edit - Invert Selection**. Refer to Menu Bar Edit

As of the writing of this manual, all frames are marked as 'Selected' by default. This default setting will be made optional in a future release of the software., please keep an eye on **Tools-Options, General** in future software releases or contact techsupport@verg.com for further information.

4.6.3 Exporting the FSA Graphic

1. Select the frame you wish to export the visual from.
2. Select **Edit-Copy** from the FSA Menu Bar.
3. Open the external program that supports the bitmap (.bmp)or enhanced metafile (.emf) file format (an image editor or word processor)
4. Go to **Edit-Paste Special.** The Paste Special window will appear
5. Select 'Picture (Enhanced Metafile)' or 'Picture (Windows Metafile)' and click **OK**.

The Display area and frame from your FSA software will appear in a new file in your selected external software. If you click on the image, you may see resizing squares around the perimeter of the image (this is software dependant). Click and drag on any of the corner squares to resize to suit your application.
HINT: Clicking on the corner resizing squares, if they appear, will avoid changing the aspect ratio of your image.

4.6.4 Exporting the FSA Data

1. Select your FSA frame or frames as described in Selecting Frames.
2. Select **Edit-Copy** from the FSA Menu Bar.
3. Open the external program that supports CSV format (comma separated values, Microsoft Excel for example).
4. Go to **Edit-Paste Special.** The Paste Special window will appear
5. Select **'CSV'** and click **OK**.
6. Your data will be pasted into the spreadsheet. Frame numbers and the date/time information will be indicated along the top (columns), statistics labels and cell numbers along the left (rows).

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F11

	A	B
1	Frame Index	4
2	Time	December 15 1
3	Minimum (mmHg)	0
4	Maximum (mmHg)	99.61
5	Average (mmHg)	14.11
6	Variance (mmHg²)	254.44
7	Standard deviation (mmHg)	15.95
8	Coefficient of variation (%)	113.06
9	Horizontal center (cm)	23.94
10	Vertical center (cm)	28.28
11	Sensing area (cm²)	1866.24

4.7 Statistics

4.7.1 Average (units)

The average of the sensor values.
Calculated as the sum of all the sensors values divided by the numbers of sensors.
The average pressure is sensitive to extreme values, which may distort its representation of the typical sensor value.

4.7.2 Coefficient of Variation (%)

A statistical measure of the deviation of a variable from its mean.
Coefficient of Variation (cv) permits the comparison of the degree of variability of the sensor values from two different sensor mat readings. That is, mat readings with different average pressures.

$$cv = \frac{\sigma}{\rho} \text{x} 100$$

4.7.3 Horizontal Center (cm)

The horizontal component of the center of pressure (lower left corner of the mat when viewing in the default orientation in the software).

4.7.4 Maximum (units)

Maximum indicates the highest individual sensor value in the displayed frame.
Note that this statistic ignores the Statistics Minimum and includes all the sensor readings when calculating their value.

4.7.5 Minimum (units)

Minimum indicates the lowest individual sensor value in the displayed frame.
Note that this statistic ignores the Statistics Minimum and includes all the sensor readings when calculating their value.

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4.7.6 Regional Distribution

Indicates what percentage (%) of the total load is in each selected region. If there is no sub region selected, this will always be 100% (entire mat).
See Selectable Areas.

4.7.7 Selectable Areas

With FSA 4, you can gather statistics for a selectable area of the sensing array. By default, statistics indicated in the statistics display are for the entire array. To select a section of the array, left click on a cell and drag the cursor over the area you want to isolate the statistics from. The statistics field will now display data from your selected cells. The text in the Statistics panel will be the same colour as your selected area's outline.
To select subsequent areas:
Hold down the CTRL button on your keyboard, left click on a cell, and drag the cursor over another area.
LOCK your selected area(s) by right clicking over the Contour Plot and selecting Lock Regions from the context menu that appears. To unlock, repeat and select Unlock Regions. Note that the locked region(s) setting is saved in your FSA file.

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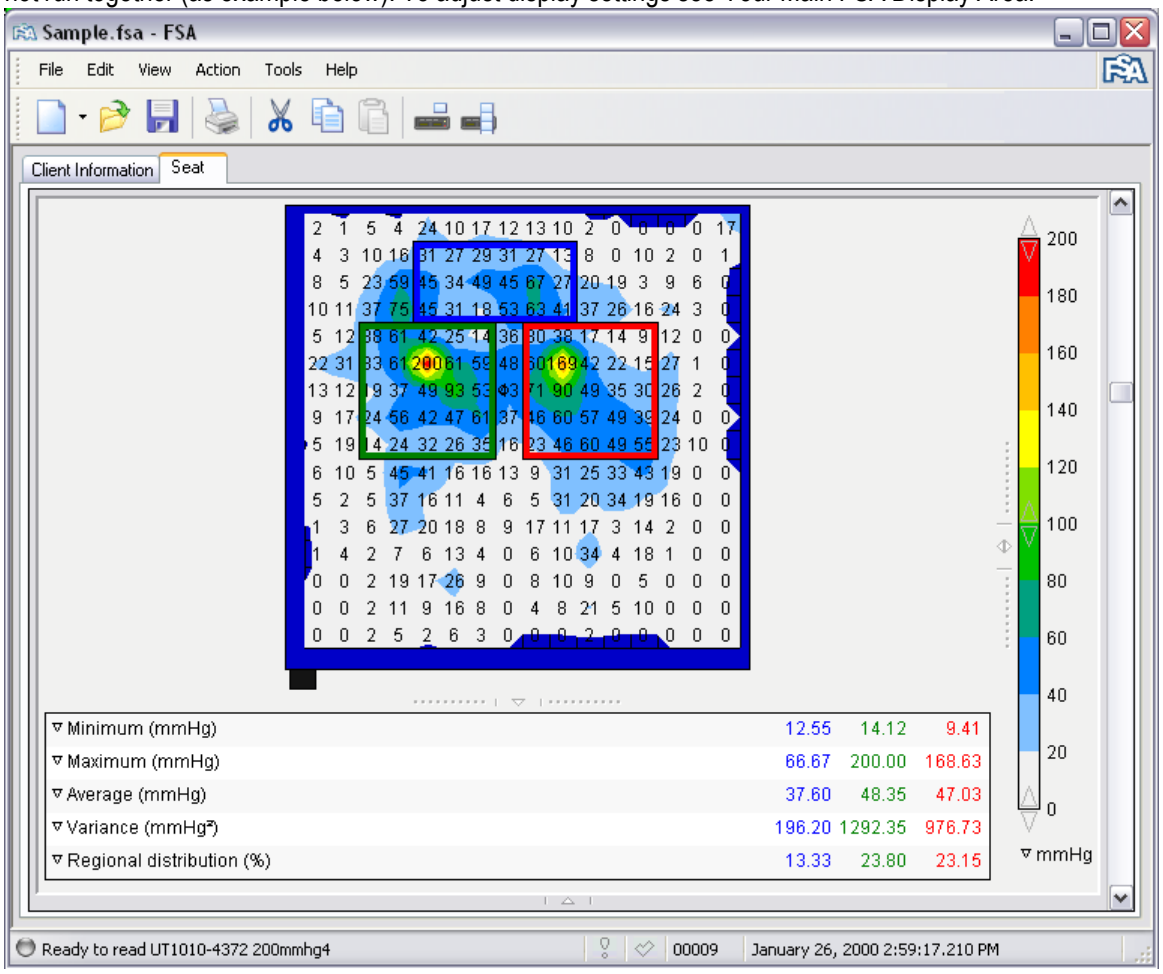
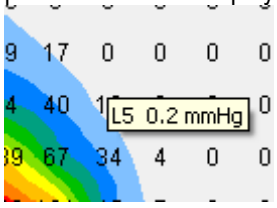
If you unintentionally click in the array when you want to see statistics from the entire array, you will notice the data in the Statistics field will indicate data from the highlighted area only. To deselect the region, click outside of the array field within the Contour Panel area.
The selected region will only be indicated in the Contour Display and Statistics, not in the Surface Plot..
If you are collecting data from a number of regions of the mat, you may want to close the 'Time' plot and open the 'Statistics' panel so that it stretches across the bottom of the main display area. The columns of statistics will then not run together (as example below). To adjust display settings see Your Main FSA Display Area.



4.7.8 Sensing Area (units)

The area of the mat or selected sub-section of the mat whose readings are at or above the statistics minimum. If the bottom end of your scale (look to your Legend display) is 0, the software will show the area as the full area of the mat, as 0 would be considered as part of the loaded area.
A a cell showing a numerical value of 0 may in fact have a load applied of less than 1 (if you hold your mouse pointer over a cell displayed as '0', you may see that as you see the values to one decimal place in the tool tip):



To omit lower values from the statistics you can raise the bottom of the display range by clicking on the

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corresponding arrow in the Legend.

4.7.9 Standard Deviation (units)

The square root of the variance.
The comparison of standard deviations for samples with different means is not informative (even if absolute magnitudes of the deviation are equal, the degree of variability relative to each average pressure could be different).

$$\sigma = \sqrt{\left(\frac{\sum_{n=1}^{N} p_n^2}{N} - \bar{p}^2 \right)}$$

4.7.10 Statistics Minimum

The Statistics Minimum is the minimum sensor reading that will be included in all statistics calculations (excepting Minimum and Maximum), and is equal to the display minimum (refer to Display Range Values). Raising the minimum changes the statistics minimum.

4.7.11 Variance (units)

A measure of the variability, or dispersion, of individual sensor values around the average pressure value.
Calculated as the arithmetic mean
of the squared deviations from the mean.

4.7.12 Vertical Center (cm)

The vertical component of the center of pressure as measured from the origin (lower left corner of the mat when viewing in the default orientation in the software).

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5 Calibration

5.1 Why is Calibration Needed?

An uncalibrated mat gives relative pressure information. A sensor at 100% is reading its maximum detectable pressure for a given gain. The same pressure that one sensor reads as 100% may be read by another sensor as 70%.
Calibrating a mat defines for every individual sensor the corresponding pressure (for example in mmHg) of detected pressure at each known % for the entire pressure range. It also establishes creep and hysteresis values and attempts to correct for these errors.

5.1.1 Creep and Hysteresis

Creep is a function of time. The creep correction is applied from the time the sensors are initially scanned and is reset to time zero each time the sensor readings fall to zero. FSA software manages creep and hysteresis.

5.2 SensorArray Files

The SensorArray file contains a detailed description of a SensorArray (aka mat) including the number of rows and columns, the recommended range, the size and shape of the mat and the shape and colour of its cover and cable. Along with this description, the SensorArray file contains a collection of calibrations, including a "factory" cal that the user cannot delete or overwrite.
New FSA mats and mats sent in for repair are calibrated before they are shipped out. These files have a '.cal' extension. If you purchase a new mat or have your mat repaired, you will receive a SensorArray file with your mat. To install the file to your FSA4/SensorArrays folder:

- Browse to your CD drive using My Computer or Windows Explorer. Double click on the file.

FSA 4 will open and a suitable RECTANGULAR display (template) will appear.

- Go to **File-Save** and save the resulting rectangle in your Templates folder.
- Name the new Template something suitable to differentiate it from other Templates in your directory.

A copy of your SensorArray file (serial number*.cal) should now reside in your default SensorArray folder.

NOTE: If you have not been granted the ability to copy files from an external media(CD, USB key) on to your hard drive, FSA 4 will still open and you will see a suitable display, but your SensorArray file will not be copied in to your SensorArray folder. Please see your Computer administrator/IT department to have them resolve this for you.

5.3 How Often to Calibrate?

The re-calibration schedule depends on the frequency of use and the demands for accuracy.

- Frequent FSA mat use requires more frequent calibrations.
- Re-calibrate when conducting research, when statistically analyzing pressure values, or when numerical pressure values are critical.
- It is not necessary to calibrate a new FSA mat, unless you are using it for research purposes.

Re-calibration of the sensors is needed because the sensitivity of the sensors changes over time and use. This is especially true for new sensors. Field reports indicate a once a month calibration schedule is prudent.

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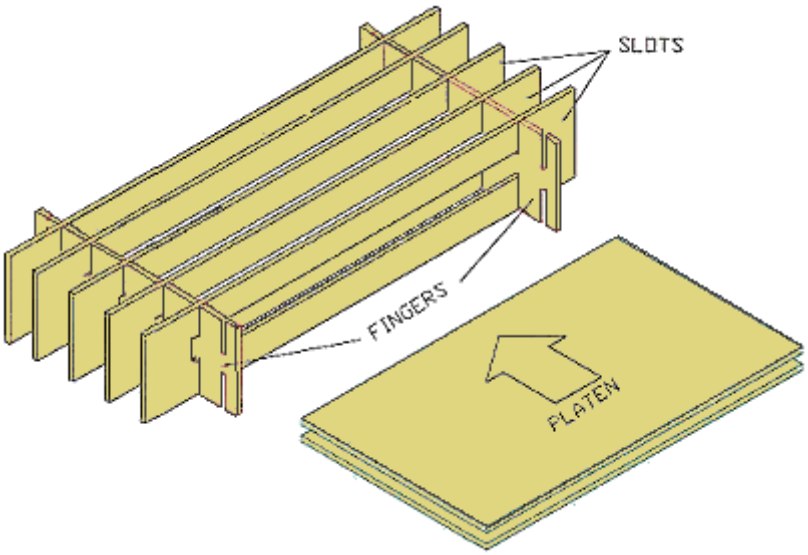
5.4 Acceptable Calibration Values

Coefficient of Variation should be less than 10% when performing validation on calibrations.
The actual reading of each sensor at every validation pressure level, should be within +/- 10% of the final calibration pressure, with respect to the pressure level. For example, when calibrating a mat to 200mmHg, look at the 120mmHg validation picture (up or down). The actual pressure readings of every sensor should fall within 100mmHg – 140mmHg range (120 +/- 20mmHg).

5.5 Calibration Instructions

5.5.1 Assembly of the Calibration Jig

1. Find 2 fingers and 6 slots (typical).
2. Place 1 finger into 6 slots. Slide the finger to the ends of the 6 slots. Turn the finger 90° to interdigitate with the slots as shown below.
3. Place the second finger into the same 6 slots. Slide the second finger to the opposite ends of the same 6 slots. Turn the finger 90° to interdigitate with the slots.
4. Repeat steps 1 - 3 until all the slots supplied are supported by fingers.



5.5.2 Placement of the Sensing Mat

1. Find platens, mat, inflator bag, latex or neoprene tubing, sphygmomanometer, and air pump.
2. Attach latex tubing to the 2 connectors on the inflator bag.
3. Layer, from bottom to top:
   i) **Platen**
   ii) **FSA mat**, top up, ribbon cable exiting out the front left (typical). Confirm 'top up' by the label on the ribbon cable, or by the colour of the Nylon covering (blue is up). The FSA mat should be calibrated with the plastic isolation bag removed.
   iii) **Inflator bag**, latex or neoprene tubing exiting out the front. To ensure all mat sensors receive equal pressure, confirm inflator bag is centered over the mat. The inflator bag should rest on the mat with the

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thin side (smooth) of the inflator bag contacting the mat (label facing the mat).

iv) **Platen**

4. Grip the top and bottom platen and slide them into the calibration jig. Do not permit platens to slide over each other and disturb the placement of the mat or inflator bag and ensure platens are protruding equally from both ends of the jig.
5. Attach sphygmomanometer to one length of latex or neoprene tubing.
6. Attach air pump to other length of latex or neoprene tubing.
7. Insert the mat's ribbon cable into the interface module.

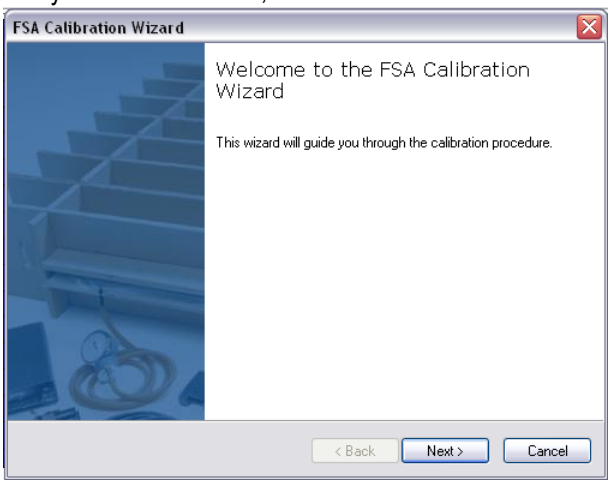
5.5.3 Calibrating the Mat Step by Step

Connect your FSA interface module to your computer as you would normally set up to collect data, stop short of connecting the sensing mat to the module.

Set up your calibration equipment as per previous sections Assembly of the Calibration Jig and Placement of the Sensing Mat.

From your FSA Menu Bar, select **Tools-Calibration Wizard**. The **FSA Calibration Wizard** will appear:

1


FSA Calibration Wizard
Welcome to the FSA Calibration Wizard
This wizard will guide you through the calibration procedure.
< Back
Next >
Cancel

- Click **Next** to continue.

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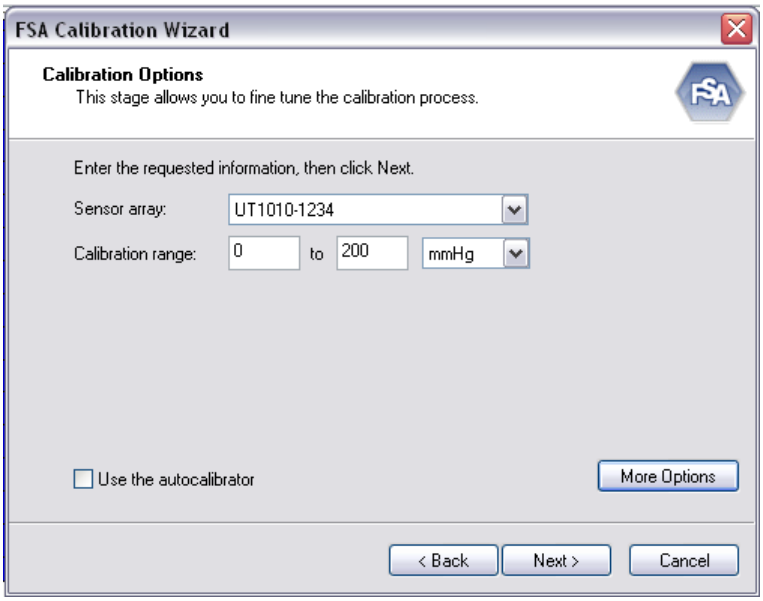
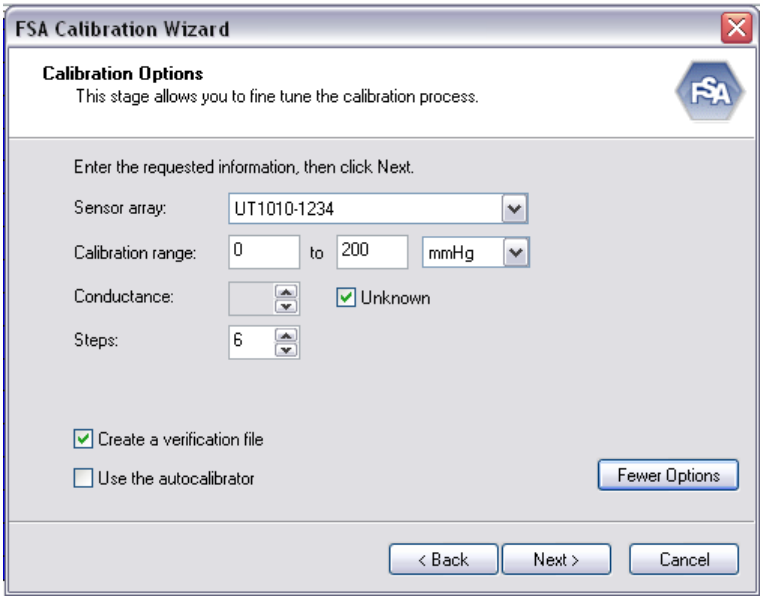
2a



- Select the mat you wish to calibrate from the 'Sensor array:' drop down.
- Choose the range and units you wish to calibrate in.
- Elect to use an autocalibrator, if you have one.
- Click **More Options** to manually set the conductance, change the number of steps in your calibration, or to de-select the option to create a verification file. We recommend you leave the settings at the default.
- Click **Next.**

2b



***More Options** selected.*

3 - The Calibration Wizard will step you through increasing and decreasing the pressure, follow the instructions in the wizard. Take the same amount of time to inflate the inflator bag between each calibration step as to deflate. Increase and decrease the pressure smoothly, do not STOP at each pressure level, just reach the pressure, hit enter, continue on. *Consistency is the key to a good calibration*.

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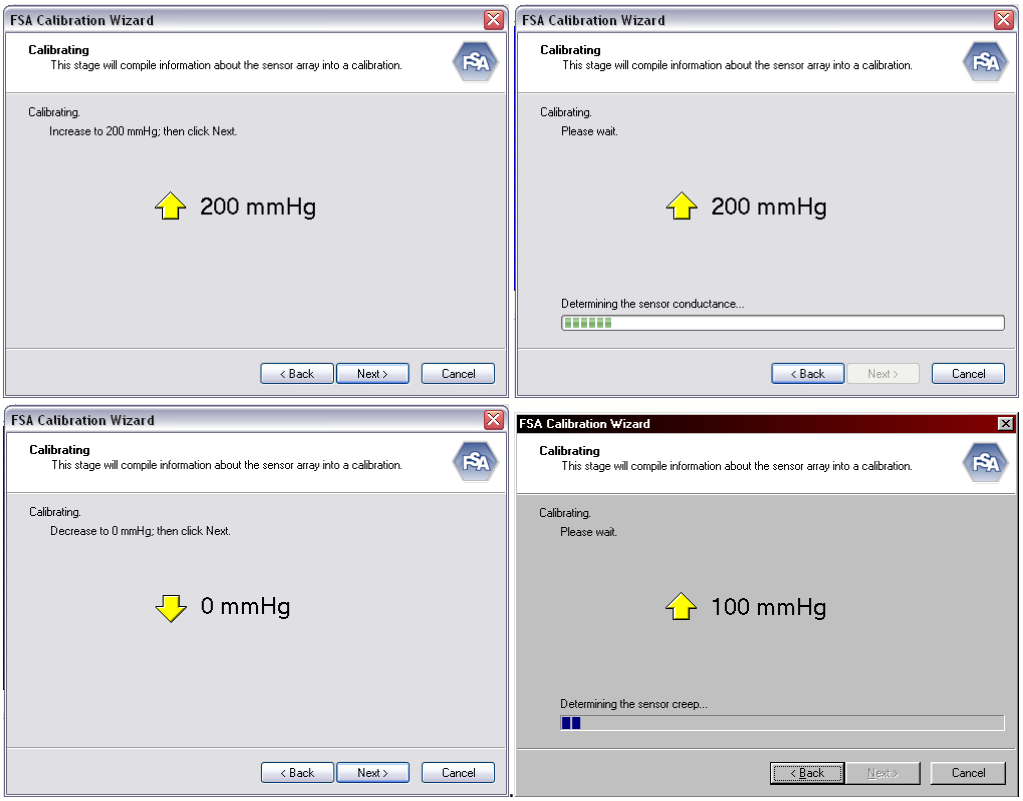
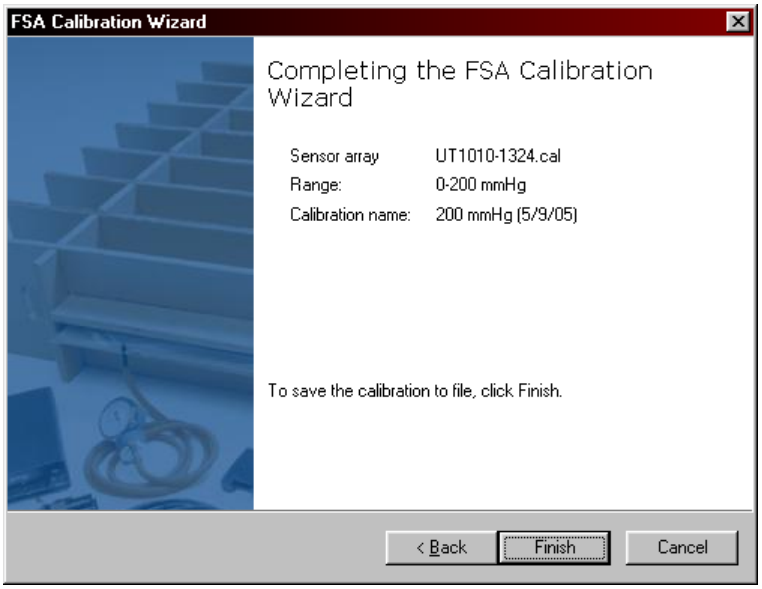


first three examples are taken from FSA running on Windows XP, the final from FSA running on Windows 98.

4



- Final frame. Click **Finish**.

What you will see next is your verification file, if you elected to create one. View your file to decide if it is acceptable. We suggest you save that file in your 'C:\Program Files\FSA4\Documents' folder as a verification of your calibration. If you are not satisfied, please return to **Tools-Calibration Wizard,** and repeat above.
The calibration is invalidated if the direction of the calibration pressure is reversed during the calibration. That is, while inflating the inflator bag to the maximum pressure, air cannot be released from the inflator bag. Similarly, while deflating the inflator bag, air cannot be added to the inflator bag. *If you overshoot/undershoot the pressure*

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level desired, cancel the calibration and start over.

5.5.3.1 Calibration Validation/ Verification

Valid verifications of a calibration must be performed at the time of calibration, before the apparatus has been disassembled post calibration. The option to create a verification file is selected by default, verify that is the case by clicking the **More Options** button found Calibration Wizard window 2 and viewing that option. The software will then step you through creating a verification at the end of the calibration process. Once the process is completed, review your verification file. It is not saved by default, you must save the verification file if you want to keep it. *Once the calibration assembly has been disassembled, a verification file performed on the mat would be invalidated by a number of variables such as changes in the loading of the inflator bag on the mat, slight differences in the calibration jig (if performed on a mat calibrated elsewhere), slight differences in the user performing the calibration, etc.*

5.5.4 Calibrating your Optional Shear Sensor

Calibrating the Shear Sensor

1. Open the FSA 4.0 software.
2. Go to **File- New,** select **Shear** Click **OK**.
3. Go to **Tools - Calibration Wizard.** Click **Next.**
4. In the 'Sensor Array:' drop-down box select the serial number of your Shear Sensor.

The Sensor Array File, {serialnumber.cal}, must be in the \\FSA\4.0\Sensor Arrays Folder.
You can now choose to calibrate the Normal pressure elements or the Shear force elements of this sensor. After calibrating either one, repeat above steps to calibrate the other as follows.
To calibrate the Normal pressure sensing elements:
If you are using an AutoCalibrator, check 'Use the AutoCalibrator' and follow the instructions for AutoCalibrator setup and use, as described in the FSA4 Help File.

1. Place the sensor in a standard calibration jig with an inflator bag
2. Select "Normal", click **Next**.
3. Follow the steps in the Calibration Wizard.
4. Click **Finish**.

To calibrate the Shear force measurement:

1. Place the sensor on the Shear Calibration Tilt Table
2. Align it as shown on the printed surface, and secure the sensor to the Tilt Table with tape. The black dot should be centered at the intersection of the crosshairs.
3. Select 'Shear' in the Calibration Wizard. Click **Next.**
4. Apply the weight on top of the sensor by resting it directly over the center. The black dot on the bottom of the weight should align with the black dot in the middle of the sensor. Click **Next**.
5. After tilting the jig in the direction shown on the jig's surface and clicking **Next**, you should return the jig to its upright position before tilting in the next direction.
6. Follow the steps in the Calibration Wizard.
7. Click **Finish**.

When both the Normal and the Shear have been calibrated, the software will refer to both calibration files simultaneously. Load the calibration files under **Tools - System Settings**. Select the appropriate Shear Sensor Array file from the 'Sensor Array:' drop down list. Load the new calibration file for each of Normal and Shear, click **OK**, and you are ready to scan.

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6 FSA Optional Accessories

6.1 The FSA Autocalibrator

The Autocalibrator automates the calibration process of inflating and deflating the inflator bag when calibrating a mat. It provides a more consistent calibration because of the constant pressure increase and decrease.

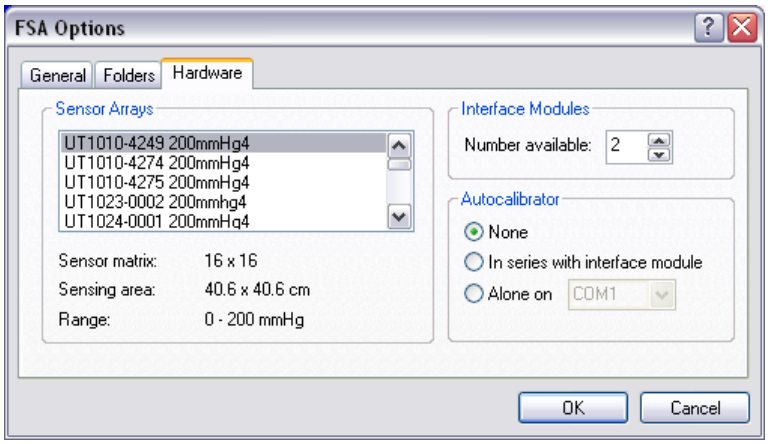
Additional Hardware Required:

1 - USB cable LI6
1 - Autocalibrator
1 - Autocalibrator Power Supply (12V) North American or Universal

NOTE: If the FSA Interface Module you are using is running through a serial port as opposed to a USB port, you will have to install the drivers for the Autocalibrator from your FSA 4.0 software CD. See Installing the FSA USB Drivers.

Autocalibrator Setup:

1. Setup the calibration jig as outlined in the calibration procedure and place the mat in the jig as instructed.
2. Connect the inflator bag to the Autocalibrator. One of the connections is for the air pump and goes to the Autocalibrator 'Pump' outlet the other is for the internal pressure gauge and goes to the Autocalibrator 'Gauge' outlet. An external pressure gauge can be connected to Autocalibrator by using a T-connector (not supplied).
3. Plug the LI6 USB cable into the Autocalibrator USB slot on the back of the device and an open USB port on the computer.
4. Plug the 12V Autocalibrator Power Supply into the Autocalibrator and into the wall outlet.
5. Plug the 9V Interface Power Supply into the interface module; plug a FSA mat into the appropriate port on the front of the interface module.
6. Go to **Tools-Options** and click the Hardware tab. For a USB Autocalibrator, select the 'Alone on' option and choose your COM port. To determine which COM port you are on, check your Windows Device Manager found under Start - Control Panel - System - Hardware - Device Manager. Look under Ports (COM and LPT) for 'USB Serial Port. It will give you a COM number. Close out of Device Manager.



7. Open your FSA software, select the Template you are using, then go to **Tools-System Settings.** If the

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mat icon does not indicate the serial number of the mat you will be recalibrating, select the correct sensor array from the Sensor Array: dropdown and click **OK**.

8. Go to **Tools-Calibration Wizard** and click **Next.**
9. Check the 'Use the autocalibrator' check box , click **Next.** The Calibration Wizard will begin the calibration process.

The software will create a verification file by default unless you de-select that option in step two of the calibration wizard. This file will be open once you click 'Finish' at the end of the calibration, view your file to decide if it is acceptable (see Acceptable Calibration Values). We suggest you save the verification/QC file for your own reference. The verification file is also useful in case you need to contact Technical Support.
Note that any air leak in the system will invalidate the calibration.

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7 FAQ's

I have received and think I installed my Seat Mat sensor array files correctly, yet when I choose the 'Seat' template, I am unable to choose the correct sensor array file. What have I done wrong?

There is more than one style of 'Seat' mat. The Template you see by default is the typical and most common 16 x 16 array with a 17" x 17" sensing area.
Check your serial number from the mat cable label. If your seat mat serial number stars with any of the following: UT1020, UT1021, UT1022, UT1023, UT1024, UT1025, UT1026, UT1027 you need to create a Template for your style of seat mat. To do so either create a template from Tools-Create Template (recommended) or
Install as follows:

- Browse to your CD drive OR Sensor Array directory using My Computer or Windows Explorer. Double click on the Sensor Array (UT####-####/.cal) file.

FSA 4 will open and a suitable RECTANGULAR display (template) will appear.

- Go to **File-Save as Template**.
- Name the new Template something suitable to differentiate it from other Templates in your directory.

How do I set up the software to read every 10 seconds? How do you convert Hz to an actual time span?

Adjust the Scan or Remote frequency under **Tools-System Settings**.

To convert Hz (reads per second) into seconds per read, invert the number ;
e.g. 0.5Hz = 0.5 reads per second
1/0.5 = 2 seconds per reading
e.g. 0.1Hz = 0.1 reads per second
1/0.1 = 10 seconds per reading

To convert Hz (readings per second) into readings per minute, multiply by 60;
eg. 0.5 Hz = 0.5 x 60 = 30 readings per minute.
eg. 0.01 Hz = 0.01 x 60 = 0.6 readings per minute.

10 readings per second = 10Hz
1 reading per second = 1Hz
1 reading every 10 seconds = 0.1Hz
1 reading every 20 minutes = 0.05Hz
1 reading every 30 seconds = 0.0333Hz
1 reading minute = 0.0167Hz
1 reading every 10 Minutes = 0.0017Hz
1 reading every 30 minutes = 0.0006Hz
1 reading per hour = 0.0003Hz

I tried to print a report, and I received an error message stating FSA had encountered an error and must close.

We have had reports that you will sometimes get the error above if you try to print while you are on the Client Information tab. It has been repeatable in house but it does not occur consistently, and we are investigating. To workaround, always initiate a print while you are on a recording tab.

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My Scan and Record buttons are greyed out, I cannot collect any data.

Either you do not have a SensorArray (*.cal) file loaded for the template currently selected, you have the wrong template selected or your software is not looking for your SensorArray (*.cal) files in the correct directory. To resolve:

- Make sure your SensorArray (*.cal) file(s) are in your "C:\Documents and Settings\All Users\Application Data\VERG\FSA\4.0\SensorArrays" (default) directory using My Computer or Windows Explorer.
- Select the template that matches your FSA sensing mat from **File-New**.
- Make sure your software is looking for your SensorArray (*.cal) files in the correct location. Using My Computer or Windows Explorer, search for your '*.cal' file(s). Take note of their location, then go to Tools-Options, Folders and Browse to that directory. Click OK.

If you just installed FSA 4.0.XX and were running FSA 3.1, your SensorArray (*.cal) files are not automatically copied into the new software. You will need to copy them from your FSA 3.1 directory which by default is C:\Program Files\FSA.

I have recalibrated my mat, but I cannot find/access the new calibration.

-Go to your SensorArray directory using My Computer or Windows Explorer (the default is 'C:\Documents and Settings\All Users\Application Data\VERG\FSA\4.0\SensorArrays').
-Find the SensorArray file for your mat (look for the file with your serial number in the filename).
-Right click over your mats SensorArray file then left click on Properties from the pop-up menu that appears.
-On the 'General' tab, under 'Attributes', make sure 'Read-Only' is not selected. If it is, de-select that option then click OK.

For previous FSA 3.1 users: *In FSA 3.1 when you recalibrate your mat you get another '*.cal' file, in FSA 4.0 your mat will have one and only one '*.cal' file. In FSA 4.0 that file is referred to as the mats 'SensorArray' file. When you run through the Calibration Wizard in FSA 4.0, the Wizard asks you to select your SensorArray in frame 2. It then steps you through recalibration and the creation of a verification file, if the latter default option is selected. The resulting calibration is added to your mats SensorArray file. After recalibration, go to Tools-System Settings and click on the FSA mat icon. To the right you will see your mats SensorArray file listed, and a 'Calibration' section below that. If you de-select the default option 'Always use the newest calibration', then click on the dropdown below that, you should see a calibration range with todays date in brackets follwing it, as well as the factory calibration that does not have a date after it. That indicates that your calibration has been saved to your SensorArray file. Re-select 'Always use the newest calibration', if you like (recommended), click OK.*

The Statistics I am seeing are wrong, the values on the Contour Plot are different.

You have a sub-section of the mat selected, and the Statistics display is only showing you the values for the selected area. Look at your Contour plot, you should see a small, rectangular blue outline. Left click in the Contour Plot display panel, but off of the sensing area display, to de-select the selected area to get the statistics for the entire mat again.

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